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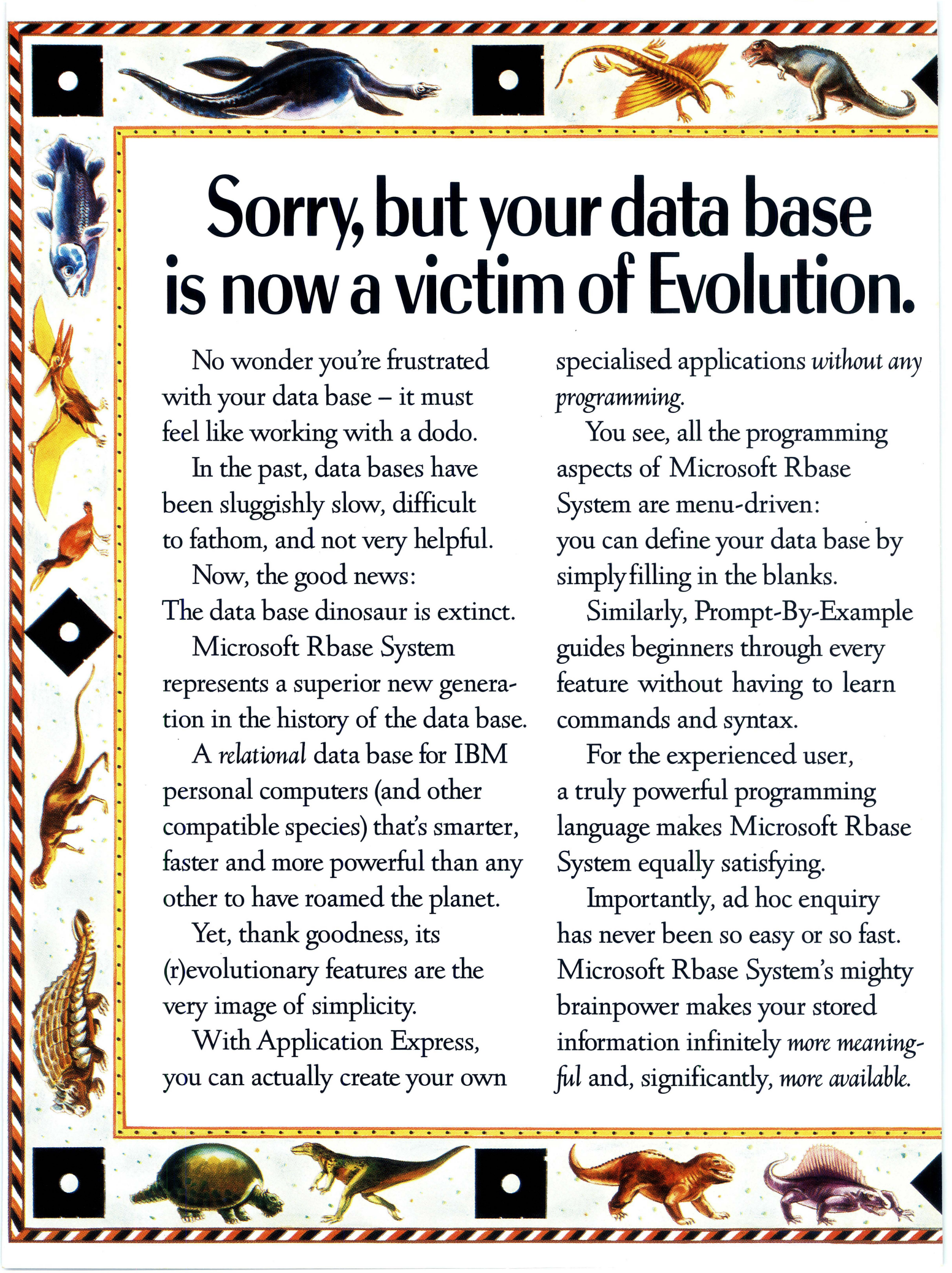
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CAD and GRAPHICS FEATURE

CATALOG OF CAD PRODUCTS



**Atlantis 386 • Zoom Boards • Microbee File
4 MIP Supercomputer • Local Area Networks
Framework Competition Winners • Printers**

A decorative border surrounds the central text area, featuring various prehistoric animals. At the top, there is a blue plesiosaur, a yellow pterosaur, and a green T-Rex. On the left side, there is a blue fish-like dinosaur, a yellow pterosaur, a red dinosaur, a black diamond shape, a brown dinosaur, and a green dinosaur. At the bottom, there is a green turtle, a brown dinosaur, a black diamond shape, a brown dinosaur, and a purple dinosaur. The border is decorated with a yellow and black striped pattern.

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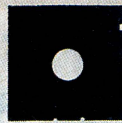
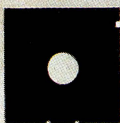
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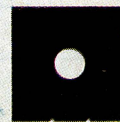
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Cad and Graphics

On the cover are two of this month's featured products: the Atlantis 386, with all the power you need for graphics and Computer Aided Design, and the Kenelec four-color plotter Sweet-P (there must be a story in that name!).

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To help with the last minute shopping rush, we've put together an issue full of gift ideas for you, your computer and the hacker of your heart.

Plus

This is the time of the year that many businesses, large and small, find their resources stretched to the limit. What better time to start preparing for next year? We've reviewed a selection of business software that'll help take the rush out of *next* Christmas.

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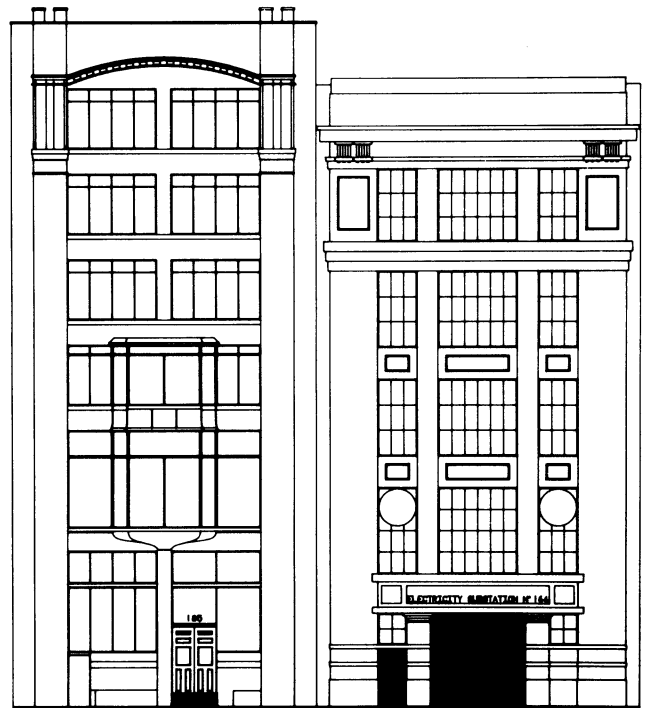
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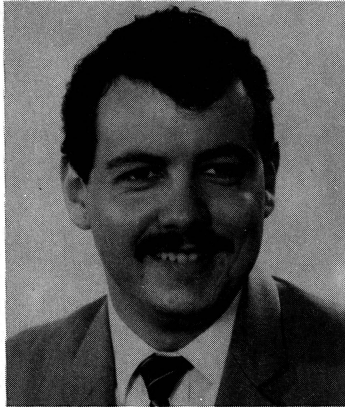
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Will OS/2 Succeed?

While the 80286 processor has been around for some years now, there is still not a generally available personal computer operating system and matching applications software to take advantage of its protected mode. In other words, the vast majority of ATs are running as high speed PCs, still suffering from the limitations inherited from the older machine's 8088-based architecture.

Meanwhile, the 80386 processor has appeared, cleverly designed by Intel so that, as well as running its own software and emulating the earlier processors to boot (just as the 80286 emulated the 8086 in real mode), the new chip also features 8086 Virtual Machine Mode. In this mode, the 80386 is able to look like a number of 8086 processors, each operating independently and appearing to the software as though it is a completely self-contained PC (hence the term 'virtual machine').

With this mode, it is possible to construct an operating system which emulates multiple PCs, and this has been done by several software companies: Quarterdeck Software with DesqView 1.3 and later, Microsoft with Windows/386, Digital Research with Concurrent DOS/386 and The Software Link with PC-MOS/386.

All of these operating systems provide multitasking operation of existing software, right now, while OS/2 is not yet available and won't have much software for some time after its release. So, two questions: is the 80286 dead, and is OS/2 dead?

The answer to the first question is: quite possibly. The 8088/86 is certainly dead for future development and for sales of PCs into the corporate marketplace. 8088-based PCs are just about acceptable for standalone word processing and small business accounting, but corporate users want their PCs to tie into networks, and in these applications the additional performance of the more advanced processors is necessary.

The 80286 will probably survive for some time in the corporate word processing and

spreadsheet markets, but for more CPU-intensive applications such as database systems, CAD/CAM and file servers, the extra performance of the 80386 will cause a strong switch towards it.

However, the current trend towards the '386 for support of multi-tasking environments is a short-term phenomenon, and OS/2 is almost certain to win the day, running either on the '286 or the '386. The reason is simply that the 8086 virtual machine mode of the '386, which is used by such operating environments, provides completely independent copies of DOS, with no support for interprocess communication and synchronisation, and with the same 640 kilobyte memory limitation that DOS has always had.

OS/2 supports up to 1 Gbyte (1,000 Mbytes) of memory per process (a process is a running program), and provides several different methods for inter-process communication, including pipes, queues, semaphores and shared segments of memory. This will allow the construction of much larger applications, and in particular the use of program systems. While most current PC applications consist of a single program, larger computers often use sets of cooperating programs which pass data backwards and forwards in various ways. The operating system I am working with right now, Concurrent DOS, is built exactly that way; each keystroke I type gets passed around by several processes before winding up in the word processor program, and the operating system itself is comprised of multiple cooperating programs.

By using these techniques, we are able to produce modular software which is more sophisticated, larger and more powerful, but at the same time, is more reliable (it is composed of units which are smaller and consequently easier to test and debug) and is also easier to configure to the needs of individual users and installations. Such software is easier to integrate into networks, for example, and will offer advanced features such as spreadsheets which are able to couple directly into mainframe databases via SNA (or

similar networks), databases which are able to present multiple user interfaces (mouse-driven, SQL-style and others) to multiple users across a network, program systems which run partly on the PC and partly on the mainframe, and other things which I can currently only guess at.

Now, try doing these things with the current crop of 386-based software. As a former British PM (Edward Heath) was famed for saying, 'Can't Be Done.' (this is the precursor of the derivative 'Life wasn't meant ...').

The OS/2 facilities are well in advance of the various '386-based quick fixes and so will form the basis of a whole new generation of software. One could even advance the argument that these '386 environments are doing the user community a dis-service by perpetuating the existence of outmoded software when it should be replaced by more advanced versions.

Now, when these OS/2 features become available to end users, they will work just as well on the 80286 as on the 80386 (except for speed) and so the 80286 will start to revive its flagging fortunes. In the meantime, the prices of AT-class machines and quite possibly the PS/2 50 and 60 will have dropped, making them even more attractive. Long term, though, the 386 is bound to win out.

The final argument in favour of OS/2 is the quality of its backing — it is supported principally by IBM and Microsoft, with other software houses such as Lotus and hardware makers like HP and DEC signing up to support it. The rest of the world can try to resist, but OS/2 is bound to win the battle of the power operating systems, almost by default.

There will always be a group of users for whom a single-tasking operating system which supports up to 640K of memory will be adequate, so DOS will live on, and the LIM EMS 4.0 standard will help to further extend its life. But the new generation of applications which will appear for OS/2 will inevitably make it the standard.

LES BELL

American Graffiti

Christmas Gifting

It's that time of year when people of foresight and taste (the kind of people who read YC, of course) begin dreaming about Christmas booty, looking for suitable gifts for others, even attempting subtlety in communicating to friends and relatives the goodies starring in their fantasies.

Sometimes, even the simplest gift can be much-appreciated. Last year, the gift that Ms. Computer Correspondent appreciated most was an extra box of fuses, a circuit tester and training on installing new fuses (Ms. C.C. sometimes forgets that it's not a good idea to plug an iron into the same circuit as her computer.)

Fortunately, several aspects of computers make Christmas gifting easier. Right off the bat, a floppy is a great place to keep a Christmas list (even if you forget which disk it's on, it wouldn't take too long to shuffle through all your disks). This is also a great way to keep a history of what you gave who last year; lists-on-disks are also a terrific way to drop a hint about what you want!

Another way that computers make gifting easier is that you can always find some sort of thingy that any computer-owner will appreciate: surge protectors, disks, prototyping boards, CRT swivel mounts — a quick flip through these pages should provide at least a dozen ideas.

For everyone except children, though, the best gift one person can give another ultimately is something that multiplies time — something that somehow creates more time to do other things, or that helps you make time to spend with friends and family. This is an especially relevant issue for those with digital dreams. Many of us who work with computers have already made computer widows or widowers of our mates. Computers and computer work often is so compelling that gifts of computer items (software, hardware, books and so on) intended to make computer users more 'efficient' or more 'productive' may well backfire: unlike other labour-saving devices, more efficient computer use does not produce more free time. Instead, it makes it so enjoyable to work at the computer that even *more* time is spent at the keyboard!

To me, the practical implication of this is that I'm hesitant about giving gifts that are too strongly work-related. Gifts of a computer nature for computer users should probably be about fun, not about work. They should give the recipient more play time, or — *heretical thought!* — otherwise remind him/her that there are other things in life besides computers. (This also means that we should be triply cautious in giving gifts to workaholics!) Bearing this caveat in mind, there are nevertheless a wealth of appropriate gifts to choose from.

Computer games are always a good standby; but if you're thinking along these lines, a game that requires two or more players is certainly preferable to one that can be played alone, or against the computer. Leave items such as flight simulators to the kiddies.

Generally speaking, matters of personal taste and preference make gifts of software somewhat perilous, somewhat like tastes in ties or other clothing, unless the would-be recipient has hinted at a specific item. If you're thinking about giving software, a gift certificate might be more appropriate. (Incidentally, an excellent choice here might be membership in one of the organizations distributing shareware. Here in the US, several organizations distribute some excellent shareware and freeware at very modest fees and publish catalogs for members listing exhaustively their offerings.)

One of the gifts I've occasionally given is a collection of some of the more obscure magazines or newsletters around. No computer user has enough time to peruse them all, or even to read them thoroughly, but a collection of magazines not usually seen can lead to all sorts of serendipitous discoveries!

Some more expensive items may inadvertently produce frustration. For example, hard disk kits are now available for many computers. Many computerists would be delighted to have one. But retrofitting an item like this to an older computer can create many frustrating hours trying to get the thing working. Moral: if giving a big-ticket, retrofit item, make sure you'll be available to help get the thing

going! (I suppose you could call this the Electric Trains principle: the giver should be available to help get the gift working!)

Modems are a natural addition to any computer system that does not now communicate and have come down significantly in cost, but a modem as a gift has some hidden catches. Here in the US, a few people who received modems on Christmas Day have temporarily gone bonkers from frustration when they realized they did not have the proper cables or communications adapters for their systems — and that stores were closed that day! Ditto phone plugs. And, of course, modems sing a siren song to new owners: 'use me, use me'. This may cause new modem owners to disappear for long periods of time (which also makes them the ideal gift for someone you'd like to disappear for a while).

Moving down to more modestly-priced gifts, most computerists can always use more memory. But if you give someone more memory, be sure it's the right kind and speed, and that the person has empty slots for it.

If you are planning to give someone memory chips, make sure too that they have some of the elementary tools associated with chips, such as a pin straightener and chip puller. (Chip pullers are not expensive and belong in the tool chest of everyone who ever looks at the innards of a computer.)

Here's a wonderful gift I heard about that won't cost a penny, and that really is the gift of time. A friend, knowing that her husband dreaded the prospect of wading through opaque documentation to learn a new word processor, learned the basics herself to show him and also prepared a quick summary of the key commands. She figured that she gained several hours with him which would otherwise have been spent listening to his muttering.

Finally, there are a plethora of smaller, last-minute type gifts that any computerist can use. Some time ago, I was given a modest gift in this category that's proven extremely useful: a box of empty Tyvek protective envelopes. (I'm a moderately disorderly person, forever misplacing empty envelopes, and I frequently reach

for the box of empties.) They could even be customized—for example: by decorating them with photos of kids, mates, pleasant scenes... There are some clever keyboard covers available for that loveable but sloppy computer user in your life (the kind prone to spilling coffee or soft drinks into the keyboard). And perhaps a keyboard drawer will help remind someone to put the computer away for a while.

As we all know, an especially important aspect of Christmas gift-giving is dropping the hint in the right way—not too brazen, but not so subtle as to be easily overlooked. One technique that's been used successfully in the past, especially for those who use their mates' computers, is

to leave files lying around containing your wishlist. (WISHLIST or GIFTLIST are some names that have been successfully used in the past.) One friend of ours made sure his wife saw his list by copying it onto every diskette she used; when he was sure it had been seen, he erased the extra copies.

I've found computers an incredible boon in Christmas gifting, particularly in doing the preparatory work to get my Christmas goodies. Here's what I'm doing: to deal with occasional absent-mindedness, Ms. Correspondent keeps her 'To Do' list on her computer, along with a program that pops up dated items when she fires up the computer in the morning. She

thinks she's the only one to put items into the file, so she never questions what her computer tells her to do. She doesn't know it, but I've planted an item on her list about buying some provocative lingerie!

On Christmas Eve, just after finishing my egg nog and stumbling around the tree, I plan to 'disappear' the leftover fuses (Ms. C. gave up ironing some time last year) and to arrange a temporary power failure on the circuit her computer is plugged in to.

I expect to have a delightful Christmas. Don't miss out on our Christmas Products section next month which features a swag of suggestions for the computerist!

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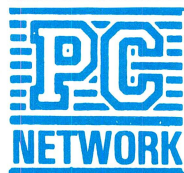
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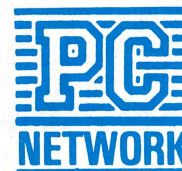
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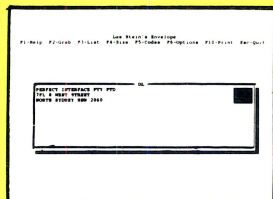
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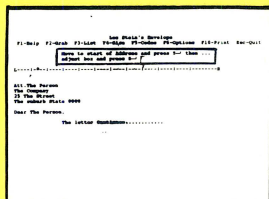
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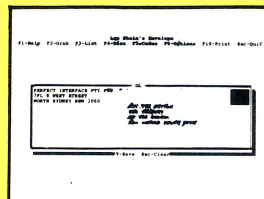
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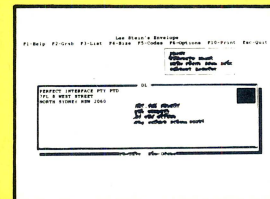
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CANBERRA COMMENT

Government Computer Dollars Go Overseas

Buying Australian is not a high priority for Telecom or the Department of Defence when computer equipment is involved.

Evidence published recently in a report from the Senate Standing Committee on Science, Technology and Environment, suggested Australia would never develop hi-tech industries without a fundamental change in government authorities' purchasing programs.

Development of new technologies is heavily supported in Japan, Europe and the USA. For example, where Australia invests \$1 dollar in electronics and computer science research, the USA invests \$74.

Because Telecom and the Department of Defence spend heavily on high-technology they have the opportunity to help develop Australian software and hardware companies.

Between them, the two departments buy 60 per cent of Australia's electronics imports. The most recent figures suggest Telecom and the Department of Defence spent \$1500 million annually on computing and communications equipment.

According to the Senate Committee report, Telecom and the Department of Defence admit not distinguishing between foreign and local industry. Their main concern was keeping prices down.

The latest figures from the Department of Defence suggest 75 per cent of money spent on new equipment went to overseas companies.

The Senate Committee hears evidence that buying locally would do more to develop Australian hi-tech industry than any tariffs, tax incentives or bounties currently available.

Whose Privacy?

A MAN IN South Australia was successfully claiming 14 Family Allowances. The Social Security Department computer questioned the payments because the children in each fake family all had the same birthday. The man was caught through lack of imagination.

Perhaps the Australia Card could stop

this type of fraud. However, many people are worried about the Australia Card invading their privacy. A recent report by the Technological Change Committee on EFTPOS systems contained an interesting section on privacy.

Legally, there is *no* right to privacy in Australia. The law also has problems defining privacy where hi-technology is involved. For example: does the act of storing personal information equal an invasion of privacy or does the information have to be used?

Buying Australian is not a high priority for Telecom or the Department of Defence when computer equipment is involved.

Australians believe their privacy is threatened and surveys suggest we want laws to protect it, but balanced against this is the general willingness of Australians to give information about themselves to Market Research companies. We seem to make good survey subjects.

Much of our fear seems linked to information stored in computers. In fact, the Australian Law Reform Commission report on privacy found only isolated cases where this happened. The fear of computers invading privacy appears much greater than actual cases.

It is the speed with which information is

now processed, rather than the amount collected which now seems threatening. As long ago as 1971, a research group at Georgetown University in the USA was given the task of developing a surveillance system for all citizens — their answer was a national EFTPOS system.

They produced a not too serious sample surveillance sheet to back up their report.

Subject: John Q Public, 4 Home street, Anywhere, USA, Male, 40, married. Electrical Engineer.

Purchases: July 13th 1984: Wall St. Journal \$1.00; Breakfast \$2.25; Gas \$6.00; Phone calls (111-1234) \$0.25; (222-5678) \$0.25; Lunch \$4.00; Cocktail \$1.50; Bank W/D \$200.00 Cash; Lingerie \$135.97; Phone call (111-8769) \$0.85; (869-1111) \$0.80; Bourbon \$12.53; Boston Globe \$0.50.

Computer Analysis: Owns Shares; heavy starch breakfast — probably overweight; \$6.00 on gas — owns VW. Total gas purchased this week: \$25.00. (Obviously doing something besides driving nine miles to work); Phone No. 111-1234 belongs to Joe Book; Book arrested for SP bookmaking in 1971, '78, '83 — no convictions. Phone No. 222-5678 belongs to expensive men's barber shop specialising in hair restoration; drinks at lunch time; W/D \$200 cash — very suspicious since all legal purchases can be made with EFTPOS; Bought very expensive lingerie — not his wife's size; Phone No. 111-8769 belongs to Jane Doe; Phone No. 869-1111 — reservations for Las Vegas (without wife); third trip in last three months to Las Vegas (without wife); no job related firms in Las Vegas; purchased bourbon, third bottle this month. Conclusion: either heavy drinker or much entertaining.

John Q Public's file contains information which is not really private. But — until recently this information was anonymous because of the huge amount collected and the slow, generally manual, processing required to correlate it.

EFTPOS systems can correlate huge amounts of data and 'personalise' it, so when mainframe computers start talking to each other privacy might suffer.

Some Federal legislation already allows this. Since 1982 the health insurance legislation gives Health, Veteran Affairs,

Canberra Comment

THE POLITICAL pulse of Australia is in the capital, Canberra, and the goings on there involving the computer scene affect us all — both professionally and privately. Starting this month, William Olsen will be commenting regularly on the implementation of government policy pertaining to the computer industry and government attitudes. □

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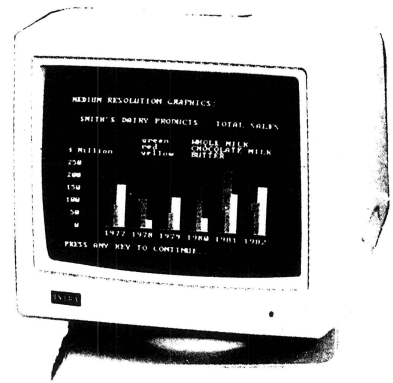
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Social Security and registered Health Funds the right to swap data.

Many government departments would like to link up with the tax computers. However, at present privacy works in favour of the Tax Department — it guarantees that the Tax Department generally gets full income disclosures, both legal and illegal.

Software copyright is a problem for schools because they often need multiple copies, but, generally, can't afford to buy them. Their choice is to not make full use of software or to make illegal copies.

Even without computers the Tax Department has a long arm where gathering information is concerned; for example, in the early 50s a Royal Commission was held in NSW about Licensed Clubs. During proceedings, many publicans came forward to give evidence about their business turnover. Each day the court reporters noticed a 'stranger' with a pencil and notebook sitting at the back of the court.

The stranger was from the Tax Department, of course. He noted what the publicans said about their business sales then compared it with their tax returns. When the Royal Commission finished, some of the publicans were hit with huge tax bills going back ten years or more — they had trapped themselves through disclosing private information for public reasons.

Copyright Problems

THE TRICKY problem of schools and software copyright was discussed recently at the National Workshop on Software for Education. Graeme Inchley from Apple Computers chaired the discussion assisted by Ian Webb from the ACT School's Authority and Lauren Horcope from the Attorney General's Department.

The 1984 amendment to the copyright act protects computer software. However, many education authorities see the problem as far from settled.

Because software production needs time and money, Inchley believes commercial organisations need a fair return on their investment. For software companies to continue producing educational programs some copyright protection is vital.

There is also a need to educate users about copyright.

Webb thought the software industry should get a fair return for its programs, but education software consumers still have the right to expect good software at 'reasonable' prices.

Software copyright is a problem for schools because they often need multiple copies, but, generally, can't afford to buy them. Their choice is to not make full use of software or to make illegal copies. Also, illegal copying is done in many instances simply because teachers, students and the community as a whole do not always take the copyright laws seriously.

Since software copyright is generally untested in courts there are real problems with interpretation. Webb gave the following examples: *Who is responsible if software is illegally copied within a school using a school computer — the person doing the copying? The principal? The school? The education system? If there is no clear statement about networking on a software package, what about schools with networks? Finally, is it legal to load several school machines with the one disk?*

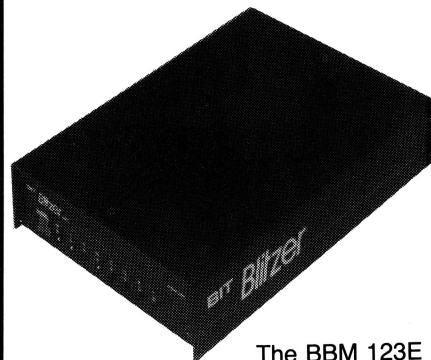
Horcope explained that the copyright act protects a computer program whether the owner claims copyright or not. When software is purchased 'off the shelf,' the purchaser has a license to use the software — they do not receive copyright in the software itself.

While the copyright owner cannot control how a purchaser uses a program, they can set limits. For example: a buyer may contract to use software on a specific number of workstations; if the software is used on more workstations than have been 'licensed,' it's done illegally. Also, copyright is infringed when an original program is copied without permission of the owner; although, Section 43A of the Copyright Act allows backup copying (unless it is specifically forbidden by the software supplier).

Legally, a copyright owner can sue for damages or take out an injunction to stop further copying. And, the 1984 Copyright Act has no special exemptions for schools, colleges or universities. However, copying a computer program without permission is only an offense if the copies are for sale or if it is proved the person copying knew they were breaking the law. □

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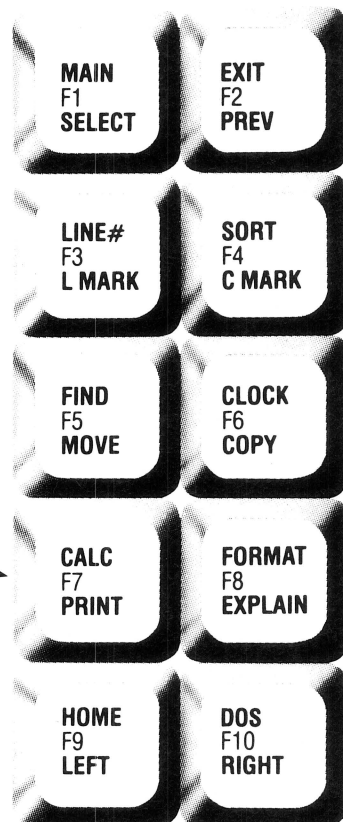
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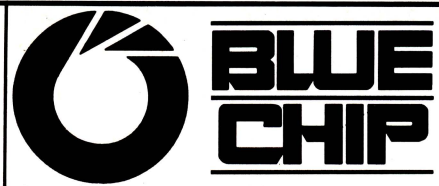
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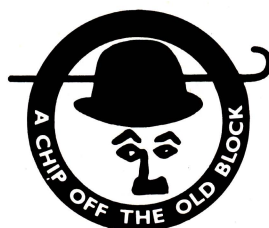
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GRAPHICS AND FRIENDLY COMPUTERS

We're all familiar with computer graphics and see a number of applications every day — but what place does 'graphics' have in the computer industry itself? Some thoughts from Dr Paul Gardiner, director of marketing for Apple (Australia) . . .

The future of the personal computing industry is not what it used to be. Standards, strategy, survivability and so-called 'conventional wisdom' are currently under review. For the industry watchers, 1986 and 1987 represented the years of living dangerously. Assumptions that were cast in iron nine months ago are now wearing thin. Industry forecasts are being revised and rewritten on a quarterly, if not monthly basis. In less than a year we have gone from 'what if' to 'what now' to 'what next?'

This article was extracted from a speech given by Dr Gardiner at the 1987 Australian Computer Society Conference.

Less than 15 months ago, everyone thought there was safety in numbers, that going it alone would be a fatal mistake. But in the cold light of 1987 we have learnt that following the crowd can be equally as hazardous — a one way ticket to conformity, cut throat competition and mediocrity.

It is perhaps the understatement of understatement to say that Apple has always resisted conformity, and always stood apart from the industry. During the good times this attitude has made them pioneers, innovators, high tech entrepreneurs, leading edge; during the bad, it has made them mavericks, misfits, the industry loners. What is the philosophy behind Apple's being different?

Being different is easy, but offering a 'meaningful difference' and turning it into an advantage is a substantial challenge. Without meaningful difference the personal computer industry will continue its march into a grey commodity world where growth, profitability and innovation will be measured by single digits, or even fractions.

Meaningful difference starts with a philosophy that says 'technology must serve the individual, and not the other way round' — it sounds like an overworked cliché, but many of the industry's problems stem from this very basic point. The industry has never come to grips with the contradiction inherent in the phrase 'personal computing.'

Apple has focussed on the personal side of the equation, which is the focal point of product development and design. Since much of the industry heralds from the data processor world, they stay true to

their computational roots. They are successful at bringing raw computing power down to the desktop but the personal side of the industry is compromised or forgotten altogether.

Apple's meaningful difference is based on the belief that technology must be usable before it can become useful. Fortune magazine recently focussed on this issue when a cover story proclaimed 'The Puny

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Payoff from Office Computers.' To quote Fortune, 'managers and consultants who have studied the problem offer several explanations for why computers have not improved white collar productivity. Getting large productivity benefits from computing systems usually requires a learning process.' The article goes on to say, 'many personal computers, especially machines bought during the PC boom of 1983 and 1984, sit idle much of the time.' Apparently consultants now refer to them as 'DOSTy.'

In many ways technology has advanced way beyond mankind's ability to master it. Computers can recalculate a spreadsheet in the bat of an eye, but the average user

still can't get past page 3 of the user manual. Potential buyers are holding back on purchases because the cost and time of training has become prohibitive.

Human understanding of technology has reached the point where 'booting up a computer' these days means kicking the machine out of frustration after experiencing your fifth syntax error.

To help bridge the gap between man and machine there is a trend to the user friendly intuitive graphic interface. We all tend to overlook the impact that graphic representations have on our day to day existence, but they surround us and give us subconscious cues that help us react and make decisions in milliseconds.

Words and numbers are mankind's primary communication tools, but even the graphic manner in which we arrange words and numbers has a huge impact on our perceptions and our attention. To use that overworked phrase 'the medium is the message'.

Transparent Interface

The first area to consider in bridging the gap, is the move towards 'the transparent interface.' This touches on the movement of graphics into the mainstream applications area of personal computing, a phenomena that has been hastened by the birth of desktop publishing, and boosted by the growth of computer aided design. The Macintosh range is an example of the move towards a transparent interface for the whole industry (and an example of meaningful difference, at the same time).

The meaningful difference of the technology within the Macintosh has made it a third industry standard, the first two are, of course would the IBM PC and the Apple II. Then, there is the Apple Macintosh — this personal computer has been purpose designed to have a common interface across all software, embracing all of the major standards in the broader world of PCs, minis and mainframes from SCSI up to SNA.

It's possible to demonstrate with the benefit of hindsight that a major part of maintaining and building a 'meaningful difference' is precisely related to control over the operating system. By keeping this critical resource proprietary, you remain in the driver's seat. Once you lose control of your operating system you can be victimised by your own technology. Witness the current state of affairs in the DOS industry — it's become sort of a high tech 'killing field.' This is a direct result of the industry's love affair with operating sys-

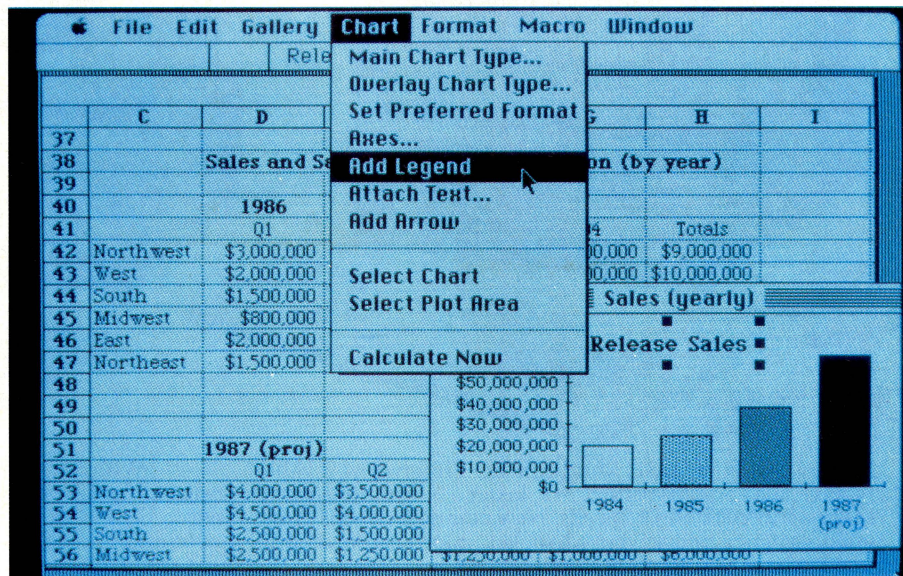
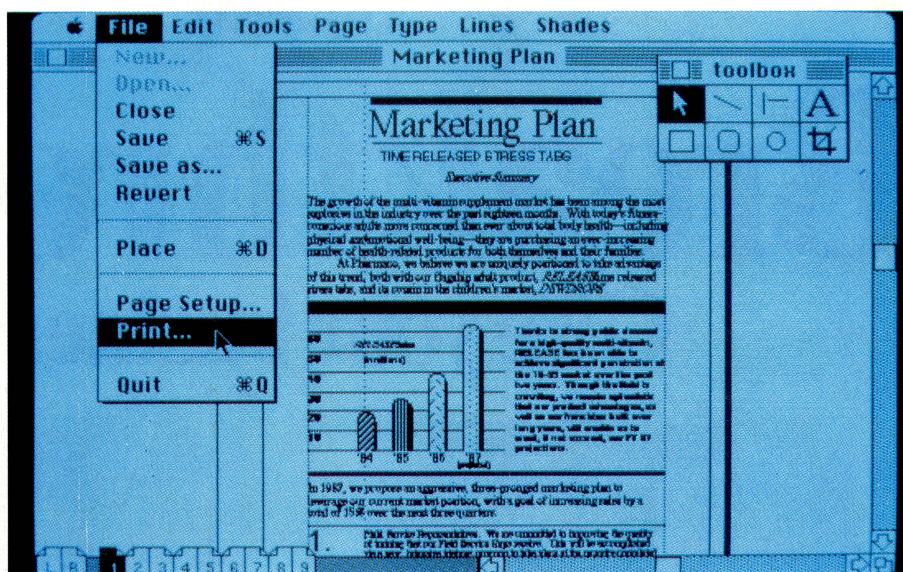


Figure 1. ROM-based Quickdraw handles the Macintosh's sophisticated graphics routines — it was originally dismissed by the industry as a tool that could drive only simplistic, paint-like graphics.

tems. It is a direct throwback to a fascination with text and numbers, a preoccupation raw computational power, bigger RAM, faster clock speeds and more disk storage. For the most part, the computer industry continues to offer more of the same, only bigger, and faster.

Consider the hardware and software gymnastics required for much of the industry to implement desktop publishing with its heavy reliance on 'graphics.' The reason for this, simply, is that the processor families being used have builtin limitations.

The System Standards

The two main computer system standards are based on the Intel 80386, and the Motorola 68020 processors. The question arises, which is going to be the standard second generation processor — the Intel 80386 or the Motorola 68020 family?

We are dealing with relatively comparable products from a processing speed standpoint. On a Drystone measurement (a standard form of testing processor capabilities), the two products benchmark approximately the same.

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gree of graphics support that each offers — with the rise of desktop publishing, graphics is moving into the mainstream application area. The architecture for the 80386 incorporates graphics and it certainly has the necessary speed. But when you compare these graphic capabilities with those of the 68020, then the Motorola has decided technical advantages. These include an onboard instruction cache of 256K containing the very fast looping instructions essential for graphics routines. This cache allows the manipulation of *lots* of data in order to be able to create very sophisticated bit-mapped screens.

There are twice the number of general purpose registers inside the Motorola as there are inside the 386. In fact the 386 doesn't have any cache on it, while the 68020 has an instruction cache, and the 68030 has an instruction and data cache.

Clearly, both sides will invest in bigger and more powerful processors. But will these shifts dramatically change the existing environment? Will they bring meaningful difference to the individual? Will they bring consistency to the software world? The truth is that of the two standards now operating in business, only the Motorola can deliver continuing enhancements with software compatibility, plus a 'meaningful difference' for the individual in the form of a consistent software interface. At the same time, the DOS segment of the industry has yet to decide on an interface standard — Will it be GEM? Will it be Windows 2.0? Will it be something else?

Graphics

Back to the key area of graphics: QuickDraw, in the Macintosh ROM, handles the sophisticated graphics routines and is the fundamental building block for desktop publishing. Yet in 1984, this brilliant innovation was dismissed as a tool that could drive only simplistic, paint-like graphics.

In the DOS world any acceptable level of graphics performance needs additional hardware in the form of a video card, and then there's the problem of choosing which one — PGA card, EGA card, or Hercules card. Which will the major hardware suppliers support if they do move into graphics? Consider also the vital area of developments: within the Macintosh ROM is the Toolbox with some 400 calls in ROM to be used by developers. The development rules are strict, so that consistency is maintained across applications.

The result is software which can easily move from one part of the world to an-

other — the 'localisation' of third party software fast has been made effortless and inexpensive. For example, you might use a remarkable utility program called Resedit which comes to us via a software genius named Gerard Hewton. Let's say you are a small software developer named Living Videotext, and you want to localise your own software product called MORE for the French marketplace.

To begin with, you want to translate the filename. So what do you do? You boot up Resedit and open the MORE menu, you merely replace FILE by typing in FICHE, NEW becomes NOUVEAU, OPEN becomes OUVRE, close down Resedit, Voila! Localisation has begun.

Is localisation really that easy? Witness the fact that Microsoft localised XL for Japan in less than two months. Such a feat usually requires a massive rewriting of code which takes a year to fifteen months. Witness the fact that an unknown UK company called Blithe Software created worldwide acceptance for a relational database called Omnis III, and that another software company called Aldus is localising PageMaker for markets throughout the world (and in the process, is creating a global marketplace for desktop publishing).

Recently, David Herringer of Apple, outlined some of the objectives of the strategic development centre. Imagine what power is brought to Australian developers with a program like Resedit. A local developer in this Macintosh environment can look at simple localising for markets right round the world.

These meaningful differences have already given Apple tremendous momentum in the international marketplace.

The graphically-capable Macintosh ROM of today incorporates long term strategic thinking — features are quietly being added that won't necessarily bear fruit for a number of years.

Connectivity

A few months ago the biggest challenge the personal computer industry faced was 'connectivity.' Whether you are dealing with data communications, telecommunications, or networking, it remains a massive undertaking for the entire industry — but less so since the release of the Macintosh and AppleTalk.

Through Apple's partnership with Northern Telecom in the US, we've made accessing a variety of computer systems on remote databases very easy. Using dialog boxes and soft screen buttons data can be exchanged with the rest of the

world via Northern's Meridian SLI switch. But receiving and exchanging large quantities of text and data from a variety of sources isn't the answer — it's only the beginning.

Again, to provide a meaningful difference these solutions must be usable — they have to address human dynamics first. For that reason, both the Macintosh SE and the Macintosh II can read or write DOS files or run DOS applications.

If you want connectivity under standards like Token Ring, SNA, X25, or Ethernet, the Macintosh has a transparent interface that will support your access into these 'standard' environments — then there is that other networking standard, AppleTalk, which is very simple, and deceptively powerful.

But to the user, all this is reduced to one password, and a few clicks on a mouse.

One other current Apple communication system, AppleLink, gives an idea of what 'meaningful difference' can look like in the systems world when the 68000, graphics and connectivity are all brought together.

When you wish to connect to a mainframe, say, two thousand miles away, you open the Applelink icon; Applelink welcomes you and asks for a password. As the connection is made, the computer gives a quick update from dialling to initial connection, to password validation, to making sure that you have enough accounts on the remote system, to waiting for the main menu.

Once you're into the system it offers you a number of databases while a flashing arrow at the top of the screen tells you that you have some mail waiting to be read.

For the technically inclined, AppleLink looks after all the micro to mainframe dialog. It does the error-free protocols, the CRC checks, the ACK/NAK handshakes, six to eight encoding, connections to the local MRC and the final access to the mainframe.

But to the user, all this is reduced to one password, and a few mouse clicks. That level of simplicity, that transparent interface — that should be the objective for all computer applications. □

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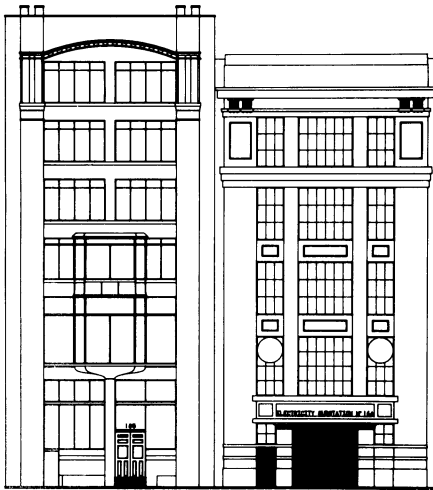
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Arthur Inglis of Comprador Business Systems traces the past, present, and future of Cad (and Cam) technology.



IF WE LOOK back even three years ago, talking about serious Cad/cam in the PC environment would have brought shouts of derision. Back then it was a pretty mediocre offering when compared to what is available today. But, even before 1975 there was some activity in the Cad area, mainly related to mainframe systems, of course. Looking even further back to the early 60s, companies like General Motors and Lockheed had undertaken some major developments in the use of computer graphics as used in computer design and drafting; many of those mainframe systems still have the characteristics that were laid down then.

We didn't see much development in the PC Cad area until Apple introduced its 850 systems in the 70s — this was certainly one of the catalysts which started people playing with computer graphics and programming some fairly limited Cad functions.

For the period from 1975 to 1981, we were generally limited to 8-bit machines, so the functions didn't allow even attempting a complex program; and of course the graphics that were available on PCs were virtually non-existent and largely limited to games. But — the foundations were laid for what was to take place in the early 1980s — the 16-bit processor, particularly the 8080 series which, for the first time, allowed development of meaningful systems.

Some of those systems that had been developed on the 8-bit Apples and the like were ported across to 16-bit machines fairly quickly, albeit still with fairly limited functions.

The pioneer machine in that environment was the Victor Sirius which had quite good resolution monochrome graphics on it; the early versions of AutoCAD certainly performed quite well on that machine.

In 1981/82 there still wasn't much activity — most of the attention has been focussed on AutoCAD — which was *the* package that sparked interest — but there were others, like Versacad, which had grown out of the Apple environment.

This article was extracted from a speech given by Arthur Inglis at the 1987 Australian Computer Society Conference.

Watch out the CAD's are CAMming

Autodesk

Autodesk was formed in 1982 by a group of 16 who had all worked together previously — they put together a collection of products to market under the Autodesk banner that included a word processor, a type of dictionary package and AutoCAD. Those were first exhibited at Comdex in 1982 and AutoCAD was so successful that the company decided to concentrate its efforts developing it.

So much so that during 1983 they actually sold something like 1000 copies in the US, which was amazing considering that the package was fairly limited in its functions back then and no one really took Cad seriously, anyway. The thing that really gave impetus to the Cad market place was the introduction of IBM PCs combined with improvements in the resolution of monitors.

NEC produced a chip while Techmar and others produced boards which gave a reasonable resolution with an IBM PC. As sales began to pick up, the software developers had money and time to spend enhancing their products. During 1984/85, we started to see some fairly significant advances in functions in the PC-based products like AutoCAD and Versacad.

The 80286

A major marketing thrust developed in 1985 with the announcement of the IBM AT using the 80286 — for the first time, Cad had the power it needed. Most users were still running on 8088 chips — you could go to sleep waiting for a zoom or a pan on one of these machines.

At the same time we started to see a lot more activity in the graphics area. IBM announced the EGA card which gave the market relatively inexpensive graphics with a reasonable resolution. And of course there were other cards (with better resolution than the EGA) around at that stage — very specialised cards like those from Control Systems, Artists and Onecards that did a reasonable job in presenting high resolution graphics on large screens — 1024 x 768.

From 1985 onward there was a tremendous boost in the acceptance of Cad on



PCs and, of course, development kept pace. AutoCAD, Versacad, Cadkey, Cad-draught, PC CAD and a host of others came out with features rivalling those found on mini and mainframe systems.

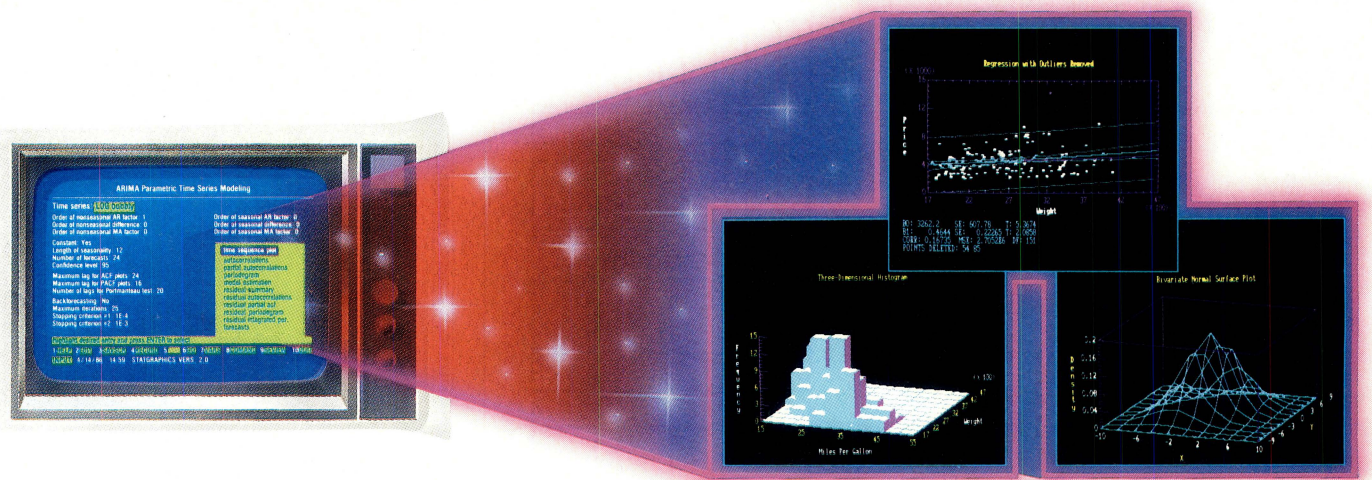
And again we started to push the limits of the software and hardware. In 1986 Compaq announced their 386 machine which gave another boost to performance; at the same time the early graphics cards were being replaced by ones like Vertacom's which uses a 68000 chip that handles some of the processing.

Memory, not Power

Now, with the speed of the 16 MHz 80386 at hand, the limiting factor is not so much the power of the machine, but the available memory. Back in 1969, IBM was selling the 360 Model 30s with 16 kilobyte and 32 Kbyte of memory; a big 360 had 64 Kbyte — you could even run spooling on such a machine, and that was great stuff!

Of course now we are talking about 16 megabytes internally, but PC-based Cad systems are still generally constrained by the

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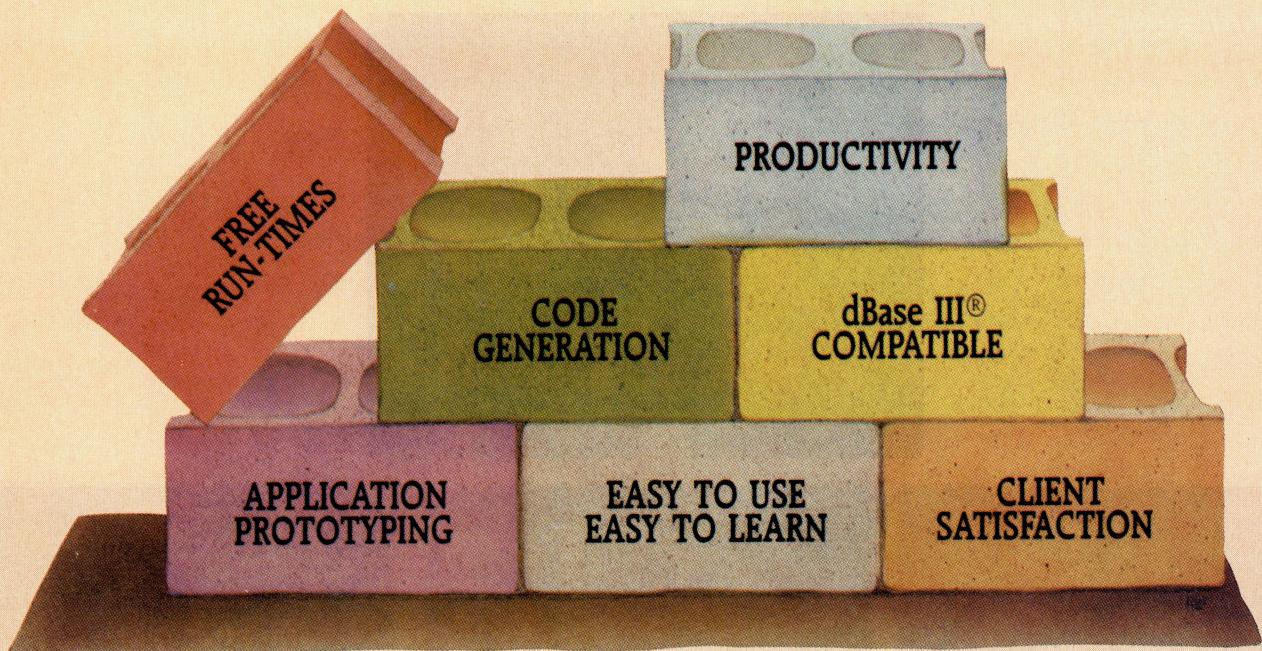
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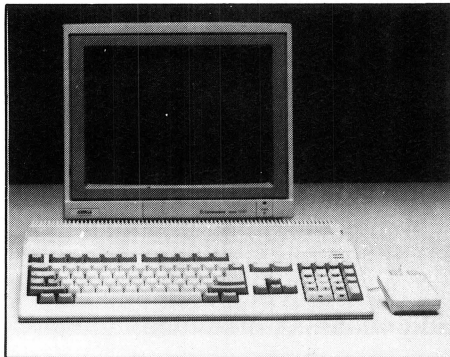
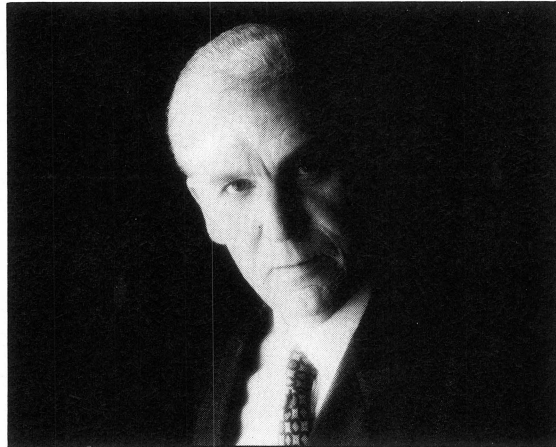
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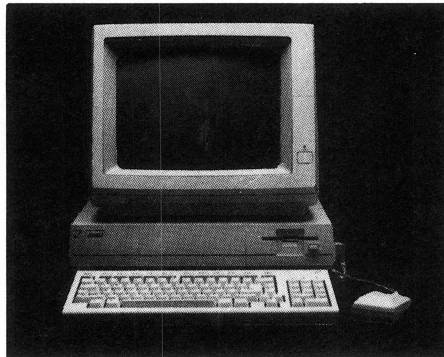
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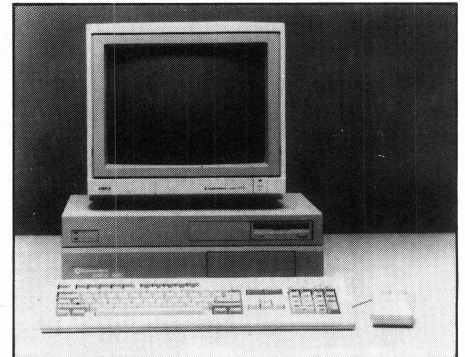
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640 Kbyte limit under MS-DOS. Of course the new range of IBM machines have overcome this, although they are still too limited in numbers to have had much impact.

CAM

The early Cam systems, if they can be described as that, were really just tape preparation systems to aid the programming of machine tools. For example, there were small packages for Apple machines that output punched paper tapes.

Of course the factors that influenced Cam are the same ones that affected Cad. Probably the most important has been the development of high speed processors — IBM's 260 Model 30 was big and it rented for around \$15,000 a month, but the power of a 386 is 3 to 4 times that of a Model 30 — certainly the I/O isn't as fast yet but the raw processing power and number crunching ability are far and away ahead of the old 30s (installed in their own airconditioned rooms, and with what seemed like a staff of thousands — and now we sit all that on a desktop).

C Compilers

One factor that has influenced both Cad and Cam has been the development of C compilers from Unix. (I've heard Unix referred to as the operating system standard you have when you are not having an operating system standard.) C has been particularly crucial in developing Cad as it is today.

Autocad is written in it; Versacad, originally written in Pascal, has been ported across to C, opening a whole spectrum for the developer.

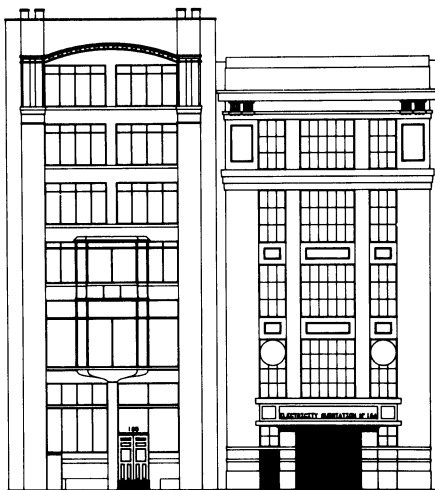
Another smart thing that some of these Cad producers did was to produce a system with open architecture — users could modify the package and add functions of their own. For example, the big strength of AutoCAD has been third party support. Initially functions were added through external programs, but now, with autolisting implemented, applications can be written internally.

The Present

Of course the result of all this is a huge installed base of Cad systems. With AutoCAD's 80,000 copies installed representing about 44 per cent of the Cad market, that represents an enormous revenue; they are selling something like 7000 copies of AutoCAD a month worldwide now. That's generating a fairly significant amount of revenue that can be used to employ more programmers and develop more and more functions.

Today, there is a wide acceptance of micro-based Cad systems in the market. Back in the early days of Comprador when we went out knocking on doors and tried to sell AutoCAD to people like architects, their initial reaction was 'well you're wasting my time — go away — nothing we do will work on a PC.' That attitude has changed dramatically; the architectural market was probably the hardest to penetrate and now there is an increasing general acceptance of the legitimacy of Cad on PCs.

Prior to that acceptance, the general attitude from mainframe or mini Cad systems producers was 'well it's a toy, don't get involved with it'. Looking back two years ago, Intergraph, a mainframe Cad package developer, ran a whole series of ads in engineering and architectural magazines pooh-poohing PC-based Cad; in effect they said, 'look, don't get involved with PCs, they're just toys — just look at the things we can do with Cad.'



There has been a dramatic reversal of that attitude and there is not one mainframe or mini producer of Cad who hasn't got a PC-based system. Many of them were a bit late in moving and felt the pinch as PC-cad moved into the marketplace.

So we are seeing a whole re-orientation of the marketplace: the revenue growth in Cad/cam systems in the US last year actually diminished but the number of workstation seats grew dramatically — that's a result of a re-orientation of the market towards the PC-based systems.

Many of these PC-based systems have functions that were only available in mainframe systems two years ago; in fact, in many cases, if you compare functions on a logical basis, the PC packages rival

the mainframe ones. And we are seeing a trend towards the intelligent workstation. This is not to suggest that there is no place for mainframe Cad, there is and there always will be, but the functionality is now down at the PC level.

A 3D Perspective

Solid modelling isn't yet available with PC packages; 3D capabilities are still limited to 'wire frames.' There are rendering packages available, though, which can be used to 'colour' the faces of an object so it looks as if it is solid.

In the future we are going to see a movement towards parallel processing. This means that some of the processing load will move from the PC to the graphics board itself where we have things like displayless processors storing the display list on the board — instead of waiting minutes to zoom in on an object, you can now do it in seconds.

On the software side we are going to see a full solid modelling capability which will backend into the Cam side where it will integrate with the generation of programs to run machine tools. We are going to see much tighter integration in all aspects. For example, the facilities planning package for architects I mentioned earlier will drive builder material and space utilisation programs, even leasing programs.

So, in my opinion, the whole market is just going to explode in the next two years.

Gains or Pains

Some salesmen will tell you that you can pay for a Cad package in the first five minutes of use. That's not true. At Comprador we have seen situations where there has been no real productivity gain, but users turn to Cad for other reasons such as more accurate drawings.

We have an architect in Sydney who has six workstations installed. They are being used for both facilities planning and architectural work. In facilities, you are just placing chairs, tables, cupboards and such things on floorplans — this is one area in which there can often be dramatic improvements. In this particular office, running just 6MHz XTs with 19 inch Artist One screens, productivity increased about two-fold — and I was surprised. I didn't believe we would see any productivity improvement in this instance.

If you come down to it — it's horses for courses and you really need to look at every particular application before you can say 'this' is what I need. □

GRAPHIC

Desktop Publishing is primarily aimed at the heart of the graphics arts industry — typesetting. But, commercial typesetters haven't been idle — newspaper consultant Mark Snell reports on their reply.

UNTIL RECENTLY, desktop publishing (DTP) has largely been ignored by the graphic arts industry. Initially treated with contempt, now it has least created a greater awareness of What You See Is What You Get (WYSIWYG) screen display.

Two major typesetter manufacturers, Compugraphic and Itek, are offering DTP packages or 'personal typesetting workstations' as they prefer to call them.

The Compugraphic PTS (Personal Typesetting System) Publisher and the Itek PTW (Personal Typesetting Workstation) run under DOS on IBM XTs or ATs and produce laser printer output.

Both may be used to drive trade quality typesetters directly *and* without the need for expensive interfaces. They are fully compatible with those typesetters and have all the standard typesetting features, including access to the full range of type styles. Also, both have a form of WYSIWYG and require no more technical skill to operate than any other DTP package.

Best of all, they are affordable. The Compugraphic PTS can be set up for about \$17,000 including computer, monitor and laser printer, while the Itek PTW costs about \$25,000 ready to run — well within the current range of DTP prices.

Jargon . . .

The PTS actually emulates Compugraphic's MCS typesetting terminal, at less than half the price, while the PTW is a new product which combines typesetting requirements with the best of PC word-processing and DTP.



At the time of writing, Compugraphic had not released its PTS system. The program reviewed was an identical product, Deskset Design (spelt with a *q*). But before going into a detailed comparison, it is worth delving into some of the concepts and jargon that are used in any typesetting or DTP system.

Whether you are a desktop publisher or a trade typesetter, certain things are unavoidable — there must be some means of determining type style, size and relative position.

By convention, type styles are called

founts or fonts and are described by names and allocated numbers for reference. Type size is defined in points, one point being roughly $\frac{1}{72}$ of an inch. Width or horizontal position is defined in ems (after the capital letter M which is the widest letter in most fonts.) or picas and points. A pica and an em are two names for the same thing: 12 points. Depth or vertical distance between lines is referred to in points. And in newspapers at least, it is also common to refer to depth in centimeters and width in columns, which is the way advertisements are sold.

ARTS AND DTP

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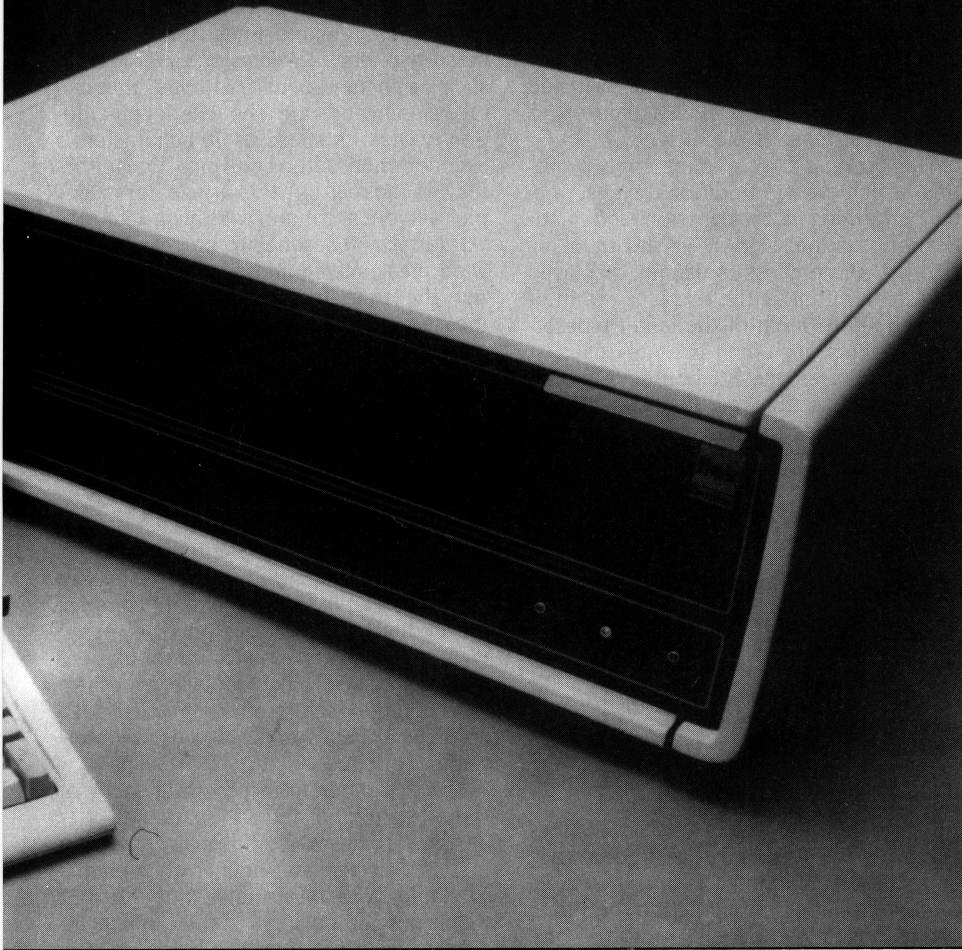


Figure 1. Itek's Personal Typesetting Workstation includes an IBM XT (or AT) with a 20 megabyte hard disk and monochrome monitor, a Digitek 4000 typesetter, and the necessary software.

There is no particular reason, other than convention rooted in tradition, that these measures need to be used and many DTP packages offer a variety of options for the user.

Typesetting is usually described in terms of line length, type size, style and line spacing, using whatever unit is pre-

ferred. Each line of characters can be set to the left of the line, to the right, in the centre, which is known as quadding the line left, right or centre. It can also be stretched to fill the full width of the line, which is known as justifying.

Characters are also described in terms of their relative width which is not dependent on type size. Tables of font widths contain the width of each character in relative units based on the capital M. The Compugraphic system uses 54 units to the em, while Itek uses 36.

The relevance of this will become ap-

parent in the following discussion, as a major difference between DTP to date and trade typesetters is the typographical control that the user can exercise.

As any user of DTP would know, the characters in each font vary in width, also, word spacing is varied to achieve setting in justified columns. Generally, the DTP user will think no more of spacing than this but — for the serious user spacing, more than anything else, is the secret to good design and the ability to exercise a high degree of control is required.

Trade typesetting machines commonly offer user control over letter spacing, word spacing and hyphenation, each of which can have a great impact on the finished product. Generally, three controls exist over letter spacing: kerning, tracking and individual widths.

Kerning usually refers to trimming the width of a letter to suit an adjacent letter. The letters AV, for instance, will look further apart in the word HAVE unless the AV pair is kerned. Most typesetters have automatic kerning of up to 256 pairs, each of which may be redefined by the user.

Tracking refers to the overall amount of white space between letters. This affects readability and impact — smaller type requires more relative space between each letter than headlines. Most DTP packages do not provide this compensation. Typesetters do and they also offer the ability to define this setting.

Typesetters also allow individual character widths to be defined. Unlike many DTP packages, font width tables are accessible and the relative widths of individual characters can be permanently changed to suit a user's needs. Alternatively, the width of one individual letter in one job may be adjusted.

Hyphenation at the end of lines is also important to presentation as well as readability. Good hyphenation keeps word spacing as even as possible while retaining readability. As well as providing both logical hyphenation and an editable exception dictionary, most trade typesetters allow the user to specify the minimum numbers of letters acceptable at each end of a hyphenated word as well as the maximum number of consecutive lines in which hyphens may appear. In newspaper setting, for instance, a greater number of consecutive hyphens and shorter prefixes and suffixes are acceptable than in book work.

As well as this, typesetters offer control over word spacing, with the user able to define the optimum, the minimum and the maximum spacing. When the maximum word spacing is reached in justifying a line, letter spacing is implemented to fill the line out.

Many DTP packages do not even offer hyphenation, let alone letterspacing or kerned pairs and certainly do not allow the operator to set his own parameters in this area. Both the Itek and the Compugraphic systems offer all the facilities of their standard typesetters.

Another difference is in the form that the characters are stored, typesetters will commonly use an outline algorithm rather than have bit-mapped characters. This method of character reproduction is not dependent on resolution and means type sizes are available from 5 to 72 point in 1/2 point (Itek) or 1/4 point (Compugraphic) increments. It allows a variety of output devices: low or high resolution screen, laser printer or typesetter.

This also makes possible tricks such as expanding, condensing and obliquing a standard face. A trade typesetter would not normally use such gimmicks because they have the effect of an anamorphic lens rather than producing a true italic or expanded font. But where an italic or condensed font of a sans serif face is not on hand, obliquing or condensing the standard version might be the last resort.

DTP Novices

Another area where traditional typesetters and DTP programs have shown a totally different approach is in the way commands and instructions are implemented.

DTP has concentrated on being readily accessible to novices and being a pleasure to use while a trade typesetter needs speed, accuracy and efficiency from a competent operator. The DTP approach has been well documented in the pages of *Your Computer* by Matt Whelan and others.

Type sizes are often selected visually on screen by trial and error, while positioning is decided by pointing with a mouse-controlled cursor. This method does ensure the finished product is close to what is expected but it slows a good typist by making use of a mouse compulsory. It does *not* allow for accurate positioning and it isn't efficient enough for many commercial applications.

The traditional approach is to have commands embedded in a text file; each command is executed as the file is processed. The file is usually edited with a

form of word processor which keeps a running count of depth, width and other parameters.

For some time, similar products have been available for PCs which use embedded commands but they do not offer a running depth count. These products, which include JustText for the Apple Macintosh and PCTex for the IBM, have not received a lot of attention in computer magazines. They are nowhere near as much fun to look at or play with, even if they can do the job more efficiently.

At least one small weekly tabloid newspaper in Victoria, which uses an Apple Laserwriter for typesetting, has switched from the archetypal DTP, Pagemaker, to JustText for reasons of efficiency.

The running depth count, or copy fitting, is achieved in traditional typesetters by performing a hyphenation and justification routine. Known in the trade as H&J-ing, the process is usually displayed on screen either as the text is keyed in or subsequently. Most of the larger typesetting systems, including the Atex used at such papers as the Melbourne Age and the Leader suburban group, use this time-consuming process to display line breaks and calculate measures before sending a file for typesetting.

Where a display of more than just line breaks is required, it is possible to attach a 'preview' screen, usually at significant expense. This is an even slower process which constructs a WYSIWYG picture of the finished product. In practice, few people purchase such an option — it's usually just as quick to typeset the job and reset any changes required. Besides, most operators soon become proficient at using the running depth count to achieve the results they want.

As mentioned earlier, the Compugraphic PTS emulates this traditional style of operation, including the preview screen option. Text is keyed in, with appropriate commands. It is then converted to a preview screen presentation, before it is sent off to the laser printer, to the typesetter or stored to the Compugraphic MCS format disc.

A sample sentence might be —

```
<ps9><ls10><li8><ft5>Pack my box with  
five dozen <ft7>liquor <ft5>jugs.<-
```

When set it looks like this —

Pack my box with five
dozen liquor jugs.

— the type size is 9 point; each line is spaced 10 points apart; the sentence is set across a line length of 8 ems and the typeface is style 5, Helvetica; style 7 (bold) is be used for the word 'liquor.' That portion of the line, that could not be justified across the full 8 ems, would be pushed to the left. The typesetter would then be ready to start the next sentence on the next line.

The text can be H&J'ed as it is entered, with a running count in the status line, or the job can be typed in and automatically H&J'ed later. Where lines are short and many hyphenation decisions are needed, such as in newspaper columns, this can take significant time. The PTS documentation quotes its speed as 700 characters a second when setting 20 pica lines. This may sound fast but this article, for example, set on a column width of 13.6 em, would take 30 seconds to process. Such a wide measure requires few hyphenations but the time increases as the column measure gets smaller and the number of hyphens increases.

The PTS

The PTS provides function key macros which provide command skeletons ready for the user to insert the relevant numbers. Among the commands available on the PTS are some of the more complex ones commonly available on typesetters, including hanging indent and tabulation, and commands which replace an otherwise complex series of commands, such as drawing boxes and matrices, and setting in columns.

The PTS program incorporates many of the attractions of the DTP packages. It is designed to be mouse-driven, with pop-up menus, help screens and many commands available by pointing and shooting. But this is not compulsory. All the same facilities are available from the keyboard. The keyboard itself can be configured to any of several layouts and keys are available for user-defined macros.

Another facility not commonly found on typesetters, which both the PTS and the PTW do have, is the ability to read text files from a variety of word processors and graphics files from specified graphics programs. The Compugraphic system can incorporate graphics files from PC Paintbrush, Dr Halo and Lotus 1-2-3, while Itek can use GEMDraw files.

When the job on the PTS is ready for printing, it must be displayed in preview mode. This typically takes more than a

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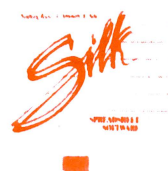
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"Epson LQ-2500+. Letter quality from 24 pin technology." JAMES DIBBLE

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no further than the new LQ-2500+ from Epson. The latest in 24 pin technology from Epson, the LQ-2500+ produces letter quality printing at an exceptionally fast rate.

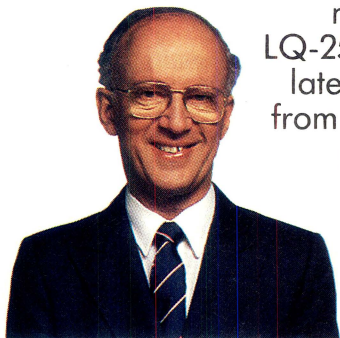
There's also a colour option for outstanding graphics

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minute. The PTS can be configured to work with several different types of graphics cards, from the standard IBM CGA with 640 x 200 resolution to the recommended Wyse 700 with 1280 x 800 resolution. The job can be displayed at actual size, 150 percent larger, twice actual size or to fit the full page on the screen.

Once it has been prepared in preview mode, it can be sent to the laser printer. Even with the required J Laser Plus card which drives the Canon engine of the laser printer directly, output takes a further minute.

While the operation of the PTS represents an unquestionable improvement over other DTP packages and even over many trade typesetters, the time spent waiting has a significant effect on productivity, particularly if the job is not right the first time.

Itek PTW

Itek's PTW system goes a long way to overcome typesetting problems and outperforms trade typesetters many times as expensive.

It does this in three ways: it has a very fast H&J routine it appears on the screen instantaneously. It allows printing to proceed as a background task while editing proceeds. And its text entry screen provides the WYSIWYG function.

Unlike the PTS, once a file is entered it requires no further processing and may be saved to disk. Up to 9 files may be placed in the print queue, for printing in turn as editing continues.

For the extra money you pay for the PTW program, you get a product which has obviously been designed by someone who has put in a lot of thought. The best of traditional typesetting is combined with the best of word processing and DTP. Productivity is never compromised and the temptation to introduce gimmicks has been resisted. Command entry procedures prevent mistakes being made and the screen shows what will be printed as the job is typed in.

One of key elements to speedy processing is that the screen display is not true WYSIWYG. Firstly, the display is 15 per cent larger than actual size, although retaining correct proportions. This means the smaller type sizes remain readable on the screen. Secondly, the display is only a representation of the font being used, showing roman, bold, italic and bold italic. It uses just one sans serif screen face to represent any type style. This also aids readability, as serif fonts are not easy to

read on computer screens. However, the major advantage is in speed.

Limiting the screen font to one style allows quick screen preparation while retaining the correct relative proportions for design purposes. An alternate screen is provided to display the full page, where it is quickly prepared using boxes and lines to represent the type.

In PTW, commands are entered at the press of a single key. They are fully prompted and avoid the insertion of figures in a skeleton required by PTS. The parameters are not displayed in the text display, other than by a hairline representing the presence of a command. When parameters need to be reviewed, it is merely a matter of moving the cursor to the appropriate place in the text and reading the details from the status panel. The panel also provides the prompts and messages as they occur.

The PTW also provides facilities common to some typesetters but not found in PTS. One is the facility to define formats — in the simplest application, this represents no more than macro substitution. For instance, typing —

```
<sf1><ps7><ls10><ll8><ft5><ef>
```

on some typesetters would store the size, line space, line length and style commands to memory as format 1. The code —

```
<uf1>
```

embedded in the text would implement the appropriate coding. A more sophisticated version, similar to a DOS batch file and sometimes called a document style, includes a series of instructions which are executed one by one by a merge, or continue, command. One such document style might then represent type specifications for, say, the New Products section of this magazine, specifying parameters for heading, supplier and then the rest of the item. The PTW uses both formats and document styles.

In Summary

In these ways, the PTW is superior to the PTS. But it should be remembered that both products represent significant improvements and value over other DTP packages.

They remain easy to use for the novice, basically being word processors with WYSIWYG capabilities. Both provide normal word processing commands such as

the ability to delete, move or copy blocks of text at the touch of a key. They offer overwrite and insert modes and both have search and replace facilities. The PTW even has a spelling checker, which can check words as they are typed in or it can be used to scan the job later. Anyone who uses a word processor should have no trouble with this aspect of the program.

Anyone who wants to be a desktop publisher has to come to grips with ways of defining style, size, line length and so on and these two packages are no exception. However, no more knowledge is needed to operate them, than is needed for other DTP packages. Both have detailed prompting and help screens which enable a tentative user to find his or her way. And while both offer a high degree of typographical control, no knowledge of the finer points of typesetting is needed to get a better result than other DTP packages. Both programs come with default settings which provide kerning and other character spacing parameters without the need for any operator involvement.

It is encouraging to see the graphics arts industry finally addressing itself to DTP. These first two products could herald a new era of sophistication in DTP. Rochester Communications is already selling a couple of PC-based typesetter utility programs. They say a second version of Desktop Design is on its way, as well as another similar product called PS Compose. □

Product Details

Product: Compugraphic PTS (Personal Typesetting System)

Distributor: Seligson & Clare Pty Ltd, 10 Cameron St, Moreland Vic. 3056 (03) 38 3433

Price: \$3300 untaxed Software only \$19,500 untaxed Complete package

Note: At the time of writing, Compugraphic had not released its PTS system, though it is available now. The program reviewed was, we understand, an identical product, Deskset Design (spelt with a q), which is distributed in Australia by Rochester Communications, 146 Darlinghurst Rd, Darlinghurst 2010 NSW (02) 330 581.

Product: Personal Typesetting Workstation (PTW)

From: Itek Graphix, 308 High St, Kew Vic. 3101

(03) 862 1733

Price: \$20,000 untaxed Basic system

AutoSketch

If you're after a drawing package that's easy to learn (and to pay for), David Chatwin has found one that offers some unique features.

WHAT DO YOU get if you cross AutoCAD with Paintbrush? The answer might well be AutoSketch. This similarity is one of the strong points of the package. If you are currently using Paintbrush (or a similar program), then you are going to feel right at home with AutoSketch. On the other hand, regular users of one of the more powerful Cad packages might think AutoSketch looks like a toy: that's a shame, as the package has a lot going for it.

Installation is very easy, it is just a matter of either copying the program onto your hard disk or making backup copies of the floppy diskettes.

The first time you run AutoSketch, it will ask you for information about the hardware configuration you are using, such as display type, printer, and other preliminaries. This information can be changed later, as required.

AutoSketch is not very fussy about what hardware you are using, as long as you have either a hard disk and one floppy or two floppy drives, a monitor with at least CGA resolution, and DOS 2.0 or higher. A minimum of 512 kilobytes of RAM is suggested, but the more RAM you have, the bigger and better your drawings can be. I would recommend using a mouse (as it is a lot easier than using the cursor keys), and of course a printer (or plotter) would be nice if you want some sort of output.

It will support plotters, as well as a

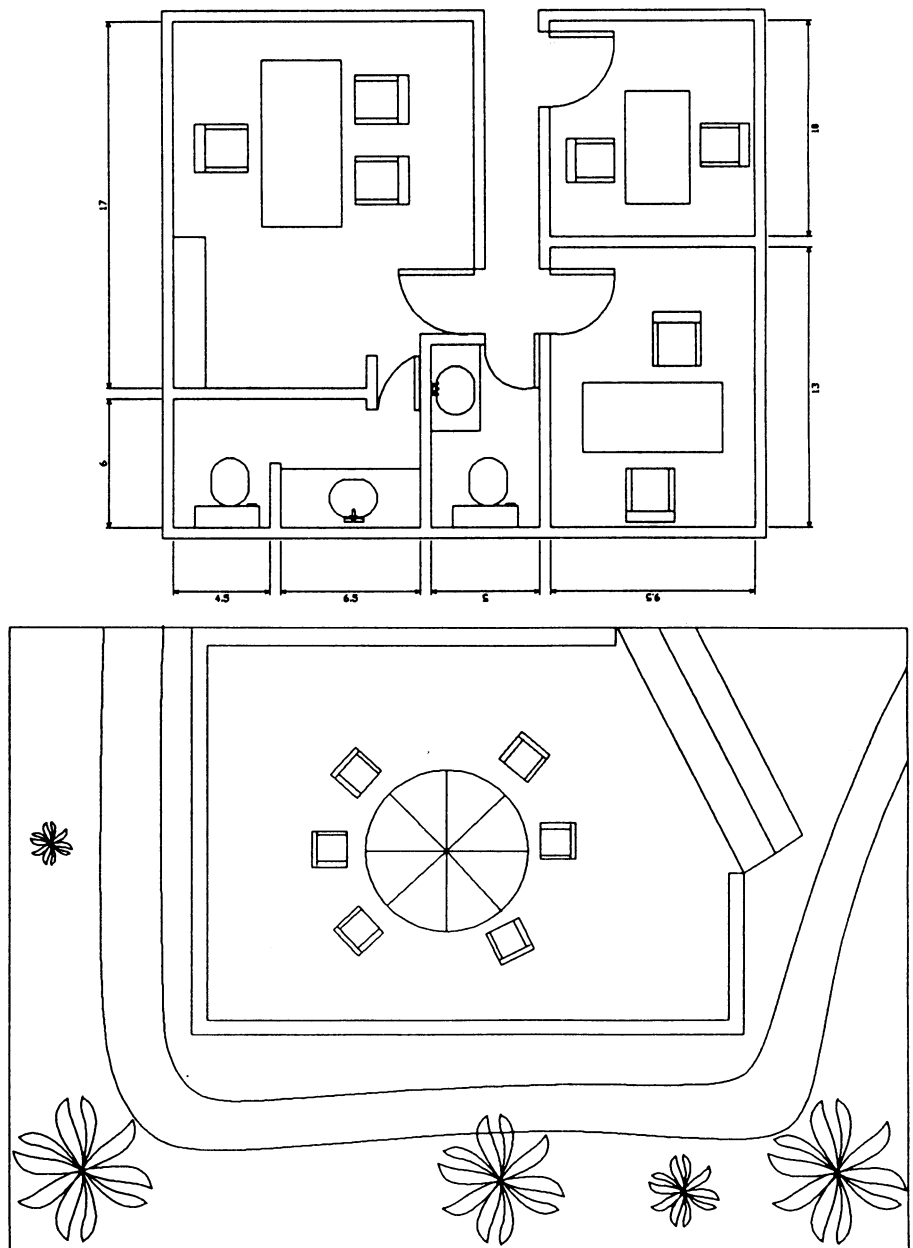


Figure 1. AutoSketch would be useful in small companies and government departments who want a Cad package for floor plans, organisation charts and other simple drawings.

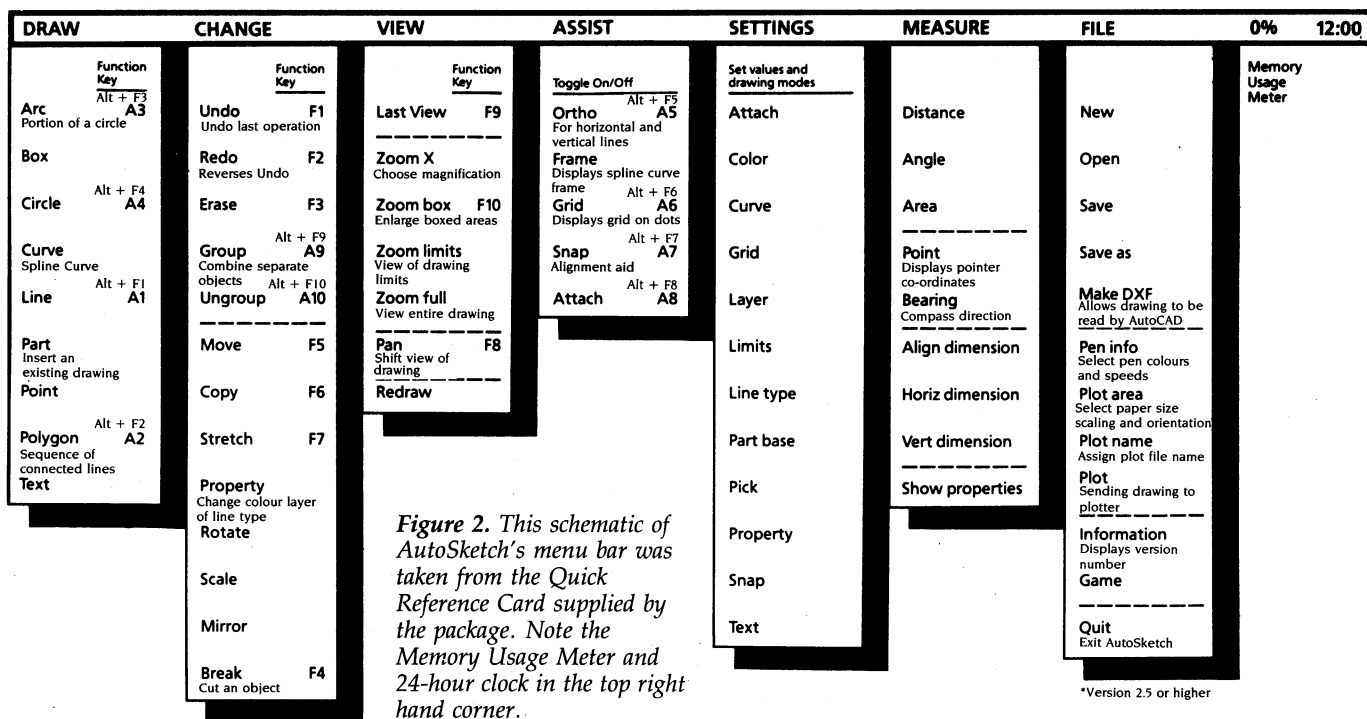


Figure 2. This schematic of AutoSketch's menu bar was taken from the Quick Reference Card supplied by the package. Note the Memory Usage Meter and 24-hour clock in the top right hand corner.

math coprocessor. There is also an enhanced version available which will only work on machines with a coprocessor. According to the distributors, the standard version of AutoSketch will run three times quicker with a coprocessor installed, whilst the enhanced version runs nine times quicker than the standard.

The AutoSketch screen looks (and feels) a lot like a normal GEM type screen, with a menu bar across the top, and a prompt line at the bottom. When you pick one of the choices from the top menu bar, a vertical sub menu appears offering all the options for that choice. You are then either presented with a dialogue box, or a prompt on the bottom of the screen, depending on what option you choose. GEM (or even Ventura) users will feel right at home with this screen, and those not familiar with it will still pick it up quickly, especially if you have used Windows.

In addition to the menu bar and the prompt line, two other useful bits of information are shown on the screen (see Figure 2). In the top right hand corner there is a memory gauge and a digital clock. The memory gauge shows how much of the available memory you have used as a percentage. This is the first time I have seen this on a Cad package, and I reckon it's a great idea that other programmers should take note of. The digital clock is less useful, but it's sometimes nice to know that it

is now 1 am and you're still playing around with the package you are supposed to be reviewing.

A Toy

When I started using AutoSketch I thought it was a bit of a toy. This 'toy' feeling was reinforced by the discovering a tic-tac-toe type game as one of the menu choices. While the game is fun (and challenging) I really feel that it may deter some of the more serious potential buyers of the package. However, once I started to use the package seriously (and was cured of my addiction to the game), I was very quickly impressed by the power and ease of use of AutoSketch.

AutoSketch is very easy to learn and after the first couple of hours I hardly needed to refer to the manual. The manual is well written for the potential market for this package. It's small, being 58 pages long, in an A5 size, but it seems to contain all the information you need. Another thing I liked about the manual was that it is written in 'plain English', with very little jargon, and an excellent glossary of technical Cad terms.

Selectability

You can either use the mouse to select from the menu bar, or use the function keys instead. In fact, templates for labelling the function keys are included in the

sample drawings that come with the package. While these may not be as neat as the plastic templates that some packages provide, they are certainly a lot cheaper and offer the added advantage that you can run another copy off if you lose or destroy the original.

There are a total of 56 drawing commands available, including commands for plotting and file saving or recall. Whilst the users of some other Cad packages may think that 56 is not very many commands, for most users it will be more than enough. All the available commands are presented on the Quick Reference Guide, which I found to be almost as useful as the full manual.

The zoom facilities are excellent, with the option of choosing the degree of magnification, seeing the entire drawing on screen, or blowing up a particular area to fill the screen. One zoom feature I liked was being able to see the last view again. This is great for zooming out to see the overall drawing, and then back in again to work on a small part of the drawing. Again, this is another feature I have not seen on other Cad packages, and I found it to be very useful.

The range of settings for the different drawing options is great, and the method of selecting the different options is very easy for first time users. An example of this is with the Line Type option. The dia-

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logue box displays the different types of lines available, and you use the mouse to point to the one you want. This by itself is not earth shattering, but the really nice touch here is if you change the scale factor, the display of the different line types changes immediately to show you how the new scale looks. This sort of approach indicated to me the thought that has gone into the development of this package.

Dimensioning facilities are good, the only real deficiency I could find was the inability to dimension an angle. This deficiency was overcome somewhat by the measurement facilities offered. There are five measurement options available which enable you to measure the distance between two points, the angle between two bearings, the area enclosed by a series of points, the co-ordinates of the cursor and the compass bearing between two points.

Making Ghosts

One feature which I found outstanding was the 'ghosting' offered when using the Change menu. This menu enables you to alter your drawing by stretching, rotating, moving, copying, scaling or mirror imaging parts of it. When you are using one of these options, AutoSketch will draw a ghost image of what the final result will be, before you actually complete the operation. The longer you give it to draw the ghost image, the better the detail. Again, I have not seen this offered on a similar package before, and it is very useful, especially when it stops you rotating a part of your drawing over the top of two hours work.

Another nice touch is the windows that are used to define the objects to be affected by a drawing operation. If you pull the window to the left, you get a dotted window, and the drawing operation will affect all objects within or touched by the window frame. Pull the window to the right a solid window appears, and only those objects entirely within the window will be affected.

Text entry facilities are good, with the ability to enter overscoring, underscoring, and degrees, plus/minus (tolerance) and diameter symbols. The obliquing angle as well as the text height and baseline angle are all easily set. I missed the ability to be able to force the text to fit within certain boundary points (as you can with say, ProDesign II). Also, there is only one font to pick from, which I found a bit of a restriction, but depending on your planned use(s), this may not be a problem.

AutoSketch is able to transfer drawings into DXF format, so that you can use them

in its big brother, AutoCAD, as long as you are using version 2.5 or higher of AutoCAD.

Plotting

The plotting/printing facilities are excellent, with a wide degree of control over how the drawing is to be output, as well as what pens to use, and what speed to use them at. I especially liked being able to select pen speed when the drawing is plotted, as this enables you take account of the pen type and plotting surface very easily.

The other plotting/printing feature I liked was the ability to define what part of the drawing is to be output, and whether the selected area is to be plotted original size, or scaled to fit the entire sheet. One of my few complaints about the manual has to do with this feature, as I found it was not very well explained.

Overall, I am impressed with AutoSketch. It is very easy to learn and use, but it still offers some quite advanced and powerful drawing features.

I can see a lot of use for this package in small companies and government departments who want a Cad package to draw up floor plans, organisation charts and other simple drawings. It certainly is not the sort of package you would think of using for complicated mechanical or architectural drawings. But for small applications, it would be ideal as it would not represent a big investment in terms of money or man-hours invested in getting it installed and running.

As with ProDesign II, AutoSketch would be an excellent investment for those people who just want to play around with Cad to find out what it is all about.

The one big advantage that AutoSketch has over the opposition is its affordability, being one tenth of the price of some of the packages on the market. Autodesk have to be on a winner, I know that I will be buying a copy, and I think that a lot of other people will be too.

Product Details

Product: AutoSketch

Distributor: Autodesk, 136 Briose Road, Richmond, 3121 Vic.

Phone: (03) 429 9888

Price: \$146 Standard package; \$179 Enhanced version (both prices taxed)

ProDesign II

WATCH FOR David Chatwin's review of ProDesign II in our December issue. □



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So, you want to get in the Cad/cam picture? Or graphics? But where do you start? If you're going to become heavily involved in either of those areas, you're probably going to need a combination of a fast machine (or an accelerator card), a high resolution monitor (or a graphics card, or both), a plotter, and relevant software. To help you get started, we've assembled a listing of a number of suppliers of those, and related products. At the end of the listing, we've given addresses for the distributors — if you want to know more about their products, give them a call (they'll be able to refer you to someone close to home).

Software

AutoCAD

Autodesk Australia
Price: \$5217 taxed

A Cad drafting program which has 3D programmed through Autolisp, custom menus, a library of application programs, and graphics interchange — needs at least an XT.

AutoShade

Autodesk Australia
Price: \$777 taxed

Surface rendering or shading program which makes solids out of wire frame drawings.

AutoSketch

Autodesk Australia
Price: \$146 taxed (Standard) and \$179 (Enhanced)

Custom Cad program which offers 2D 'associative' dimensioning, infinite zooming as well as more usual drafting features — needs at least an XT.

Chart Master

Tech Pacific
Price: \$644 ex tax

Business graphics package for displaying numerical trends and relationships in bar, line, pie, scatter and area surface charts.

Diagram Master

Tech Pacific
Price: \$597 ex tax

Business graphics package for organisation and Gantt charts. Also offers a free form drawing board to create a variety of business diagrams.

LogiCADD

Micro Australia
Price: Not supplied

A PC CAD program which produces final art work for printing.

Map Master

Tech Pacific
Price: \$1895 untaxed

Mapping, an Australian version, which allows company sales and marketing data to be shown in regions, territories, branches and so on.

OrCAD/SDT/VST PSpice

Prometheus Software
Price: See below

A low end, but powerful, design Cad package which features four zoom levels to magnify the trace display and many user selectable functions. 'Netlists' to other packages; includes a '3600' part library. OrCAD/SDT \$1275, OrCAD/VST \$1985, PSpice \$1921.

Polaris

Elcomp
Price: \$5400

A low-cost full 3D Cad package, offering up to 16 layers for display; simultaneously displays a selected subject as viewed from four independent view points; includes Cam and Bill of Materials for engineers. (Reviewed this issue.)

ProDesign II

Software Suppliers
Price: \$599 taxed

A basic Cad package that offers plotter quality output on a dot matrix printer and a 'virtual screen, said to eliminate the need for an expensive monitor and an adaptor.

Protel PCB

RCS Design
Price: \$1068 taxed

Schematic layout and design package for the Compaq portable range, using Compaq monitor with 720 x 350 resolution (\$984), and prints out to a Houston pen plotter (\$2625).

Protel Route

RCS Design
Price: \$1068 taxed

Schematic layout and design package that uses a high-res monitor (720 x 350).

QikDraw

Chan Computing Services
Price: Not Supplied

An Australian created Cad/cam package — features include 3D surface modelling, IGES drawing file exchange capability, and the ability to accept DXF input files.

Racal Redcad

RCS Design
Price: From \$7392 taxed

Speciality PCB design package; needs an AT.



TekniCAD from Tektronix shown designing a 3D colour graph.

RoboCAD-PC

Robocom
Price: Not supplied

A professional 3D drafting package using 'point and click' methods. It features a comprehensive library, intelligent hatching, and ISO Text.

RoboSolid

Robocom
Price: Not supplied
The 3D solid modeller companion to RoboCAD.

ScanPro

Software Suppliers
Price: \$1194 taxed
Converts scanner produced images so that they can be read by Cad software (circles and arcs are recognised); three resolutions.

Sign Master

Tech Pacific
Price: \$438 ex tax
Business graphics package, offering presentation quality word charts, signs and tables.

Tektronix PC-05 TekniCAD

Tektronix Australia
Price: Not supplied
Software which provides Tektronix 4105 emulation for PC/XT/AT

and compatible computers, used in design drafting work.

The Magician

Sourceware
Price: Not supplied
Versatile Cad graphics package providing full colour selection, editing of designs and portability. Available for both the IBM PC and PS/2. Features integrated business graphics.

TurboCAD

Busiware
Price: \$399 taxed
A low end Cad package that supports EGA and CGA and numerous plotters.

VersaCad Design

Imagineering
Price: \$5620
A 2D drafting, 3D modeling, bill of materials, bi directional CAD communications integrated into one package, off-line plotting that lets you designate a minimally-configured computer as a plotting workstation.

Videoworks

Busiware
Price: \$189 taxed
Animation package for the Macintosh.

Graphics Cards

Hercules Colour Card

Micro Australia
Price: Not supplied
A 640 x 200 and 320 x 400 resolution monitor with two colours in high-res and four in low. CGA compatible.

Hercules Graphics Card Plus

Micro Australia
Price: Not supplied
A 720 x 348 resolution card providing a RamFont of 3072 characters and graphic elements.

Hercules Incolour Card

Micro Australia
Price: Not supplied
A 720 x 348 resolution card which can select 16 colours from a palette of 64. Designed for IBM PS/2 as well as the PC range.

Hercules Plus

Micro Australia
Price: Not supplied
A 720344 resolution. Has drivers for Lotus, Symphony, Word, Framework.

RAMpage AT Memory Boards

Imagineering
Price: Not supplied
Provides both 6 and 8 MHz speeds and up to 2 Mbytes on each board.

Tektronix PC4100

Tektronix Australia
Price: Not supplied
High performance graphics adaptor, offering 25,000 vectors/sec, 640 x 480 resolution, 256 colours, 16 million palette, EGA and CGA emulation.

Verticom M Series

Sourceware
Price: See Below
High resolution colour graphics cards designed for PC CAD applications, particularly AutoCAD. M256E has a resolution of 640 x 480 and sells for \$4400 taxed, offering 256 colours from a palette of 262144 colours. The M16E also has 640 x 480 but only 16 colours from a palette of 262,000 — around \$3500 taxed.

Verticom H Series

Sourceware
Price: H256 \$7200 taxed, H16 \$5900
Colour high resolution graphics cards designed for PC CAD applications, particularly AutoCAD. 1,024,768 pixel resolution, with either 16 or 256 colours from a palette of 262,144 colours.

Accelerator Cards and Boards

All Aboard

IDEAssociates
Price: Not supplied
An all purpose board that can provide EGA graphics resolution and IBM mono/colour graphics — available with 10, 20 or 30 Megabyte memory.

All Aboard 286

IDEAssociates
Price: Not supplied
The 286 version of the All Aboard.

Datamatic 1000 PC Card

Datamatic
Price: Not supplied
Half-slot card with a resolution of 960 x 700. Monochrome text and Hercules graphics applications are displayed at 1024 x 700 resolution.

Everex EPGA

Vahive
Price: \$2399 taxed
A 640 x 480 resolution card with 256 colours from a palette of 4096. Compatible with IBM PGA card.

Evergraphics Deluxe

Vahive
Price: Not supplied
Compatible with Hercules RAM font card; runs 1024 x 704 and 1024 x 352 on standard monochrome monitor. Windows, AutoCAD and Lotus 1-2-3 drivers are included.

Hypertec Accelerator Cards

Hypertec
Price: See Below
Hyperace 286 \$1279, Hyperace 286 Plus \$1365, 6 MHz Maths Coprocessor \$697.



Pay-If-You-Like Software

Why pay hundreds of dollars for software? There is an inexpensive alternative for your IBM PC or compatible - and it's not illegal.

Just a couple of software packages could cost more than your clone. Unfortunately many users faced with exorbitant software costs resort to illegal copying. Now there is a legal way to acquire software for little more than the cost of a diskette.

The concept is known as User Supported Software. This approach to software marketing bypasses the high publishing and distribution costs associated with most software. For a nominal fee you can obtain high quality software and if you like the software you are encouraged to send a donation to the author, usually between ten and one hundred dollars. In other words you pay if you like the software. If the software is not to your liking you may still keep it. Manuals are supplied on the diskette and are printed out by the user.

PC-SIG is the world's largest distributor of user supported software with a library which now contains over 800 disks. Anybody can purchase disks or join as a member. Members receive our Directory, discounts and a bi-monthly magazine with descriptions of the latest additions and reviews of the more popular disks. Our magazine is not just a few photocopied pages but a professional publication of over 60 pages.

A full listing of the library is available in our 400+ page directory. The directory specifies any system requirements and is categorised into various applications.

The following is a small selection from the library...

☐ #5 & #730 PC-FILE +

Jim Button's very popular database filing system now easier to install and use and it runs faster. Reports can be prepared or set up for your word processor.

☐ #10 CHASM

A Cheap Assembler useful for those wishing to learn about assembly language.

☐ #90 & #594 GENEALOGY ON DISPLAY

Written with concern for the novice Genealogist. As well as expected features eg printing family trees, family group sheets, and descendents charts the program creates parent/child indexes and prints ID numbers.

☐ #105 PC PROFESSOR

A tutorial on the BASIC programming language which increases in complexity.

☐ #184 DISKETTE UTILITIES AND UNPROTECT

Create disk sized directories to store with the disk, create RAM disks and run popular software on your hard disk.

☐ #199 PC-CALC

Complete with tutorial and many advanced features. Similar to Visicalc. Able to import data from PC-FILE.

☐ #254 PC-DOS HELP

Just type help for an on-line help on DOS commands - very convenient for hard disk users.

☐ #273 BEST UTILITIES

A collection of utilities from earlier PC-SIG disks - RAM Disk, selective copy and delete, backscroll, browse, spooler and more.

☐ #320 TOUCHTYPE

Colourful way to improve your typing - PC keyboard.

☐ #403 PC-TUTOR

Ideal for new users to gain a basic understanding of their PC and how to use it. An interactive introduction to the IBM PC and DOS.

☐ #455,681,682 PC-TYPE +

Jim Button's WP - Mailmerge which works with PC-File, Wordstar, and ASCII files, spelling checker, whoops key and on-line help.

☐ #457 ARCADE GAMES

An assortment of arcade games including Flightmare and Spacewar.

☐ #476 PATRICK'S BEST GAMES.

An assortment of five games which will run on the Mono monitor.

☐ #478 HARD DISK UTILITIES

A collection of utilities for the hard disk user from earlier disks in the library.

☐ #480 PC OUTLINE

Can outline and organise documents point by point - ideal for typing essays and ads like this.

☐ #505 PC STYLE

Analyses text files for readability, - considers number of words per sentence, % of words of specific length, personal words, action words. Make your writing read better!

☐ #523 SIDEWRITER

Your spreadsheet too wide to print? This program turns your printout 90 degrees and prints down the page.

☐ #528 NEW YORK WORD

A full function word processor even including automatic hyphenation (and de-hyphenation). Unlike some WP it can edit large documents.

☐ #599-601 DREAM

A three disk set much like dBASE - can custom design database applications, which include reports, sorting and querying abilities, and data retrieval abilities without writing code.

☐ #618 MAKE MY DAY

A complete time management system with appointment calendar, job scheduler, time log and expense manager. All that is needed to organise your business and personal schedule.

☐ #641 MAHJONG

A fascinating game with extraordinary graphics. Excellent documentation for beginners with play levels from beginners to excellent.

☐ #646 AMY'S FIRST PRIMER

Six games to teach basic reading skills to a pre-reading child - positive reinforcement promotes "learning is fun" attitude.

☐ #669-670 GRAPHTIME II

Business presentation graphics with line, column, and pie charts. Works with dBASE Multiplan and Lotus. Has help key.

☐ #683 BUTTONWARE ADVENTURES

Two text adventure games - be a Castaway or travel to South America on a spy mission. Runs on Mono.

☐ #687-689 IN-CONTROL

Comprehensive business contact filing system with on-line documentation, high speed search, electronic Rolodex, and appointments with tickler file.

☐ #705 CHILDREN'S GAMES

A straight forward approach to making fun educational with mono graphics. Geared for 2 to 10 year olds.

☐ #708 BACKGAMMON

At last Backgammon for your PC - keeps track of points, games, gammons and backgammons. An instant opponent.

☐ #710 INSTACALC

A memory resident spreadsheet which you can call up at any time. In one step you can add a table of figures from the spreadsheet into a letter you were typing on your WP.

☐ #718 LQ PRINTER UTILITY

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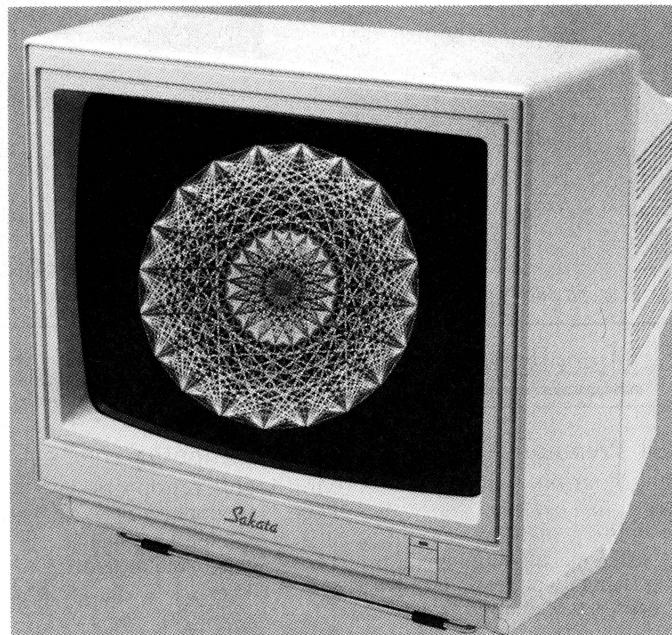
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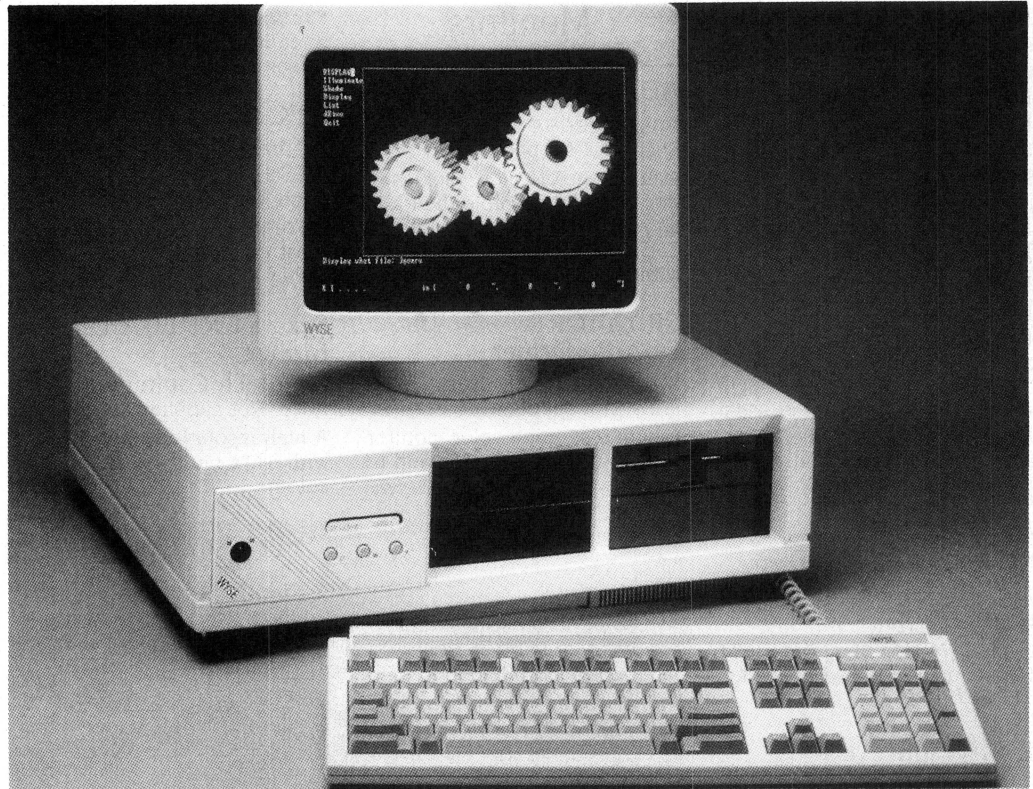
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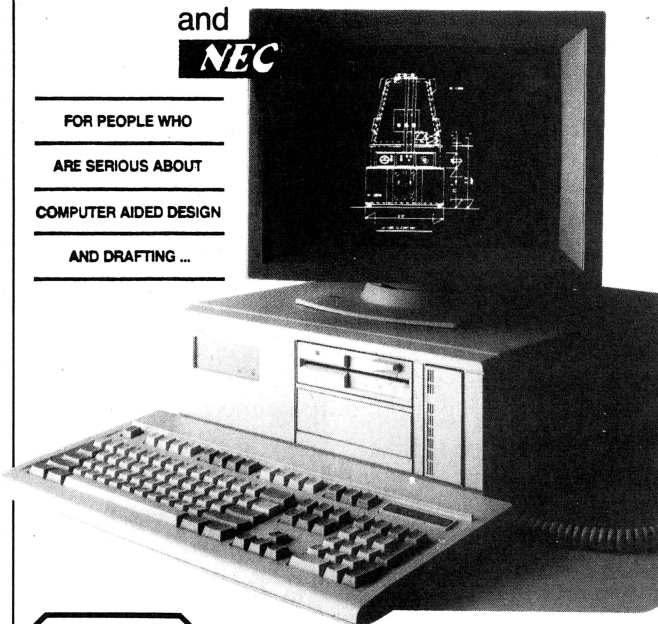
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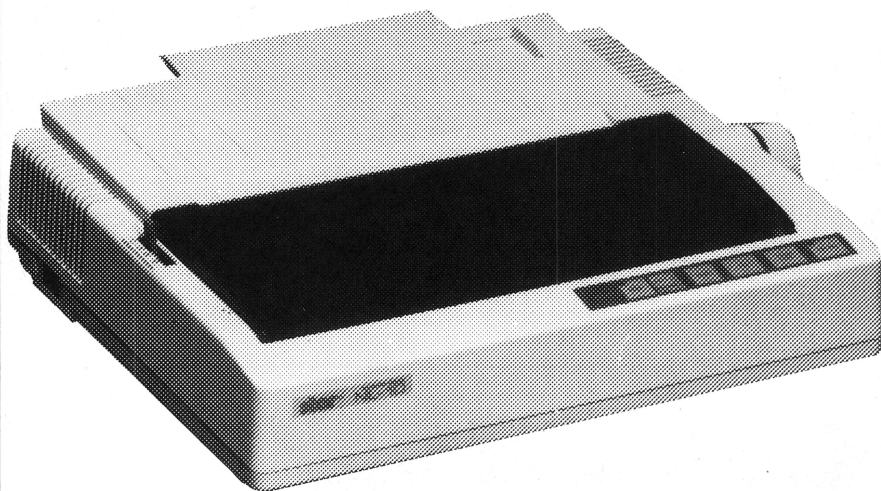
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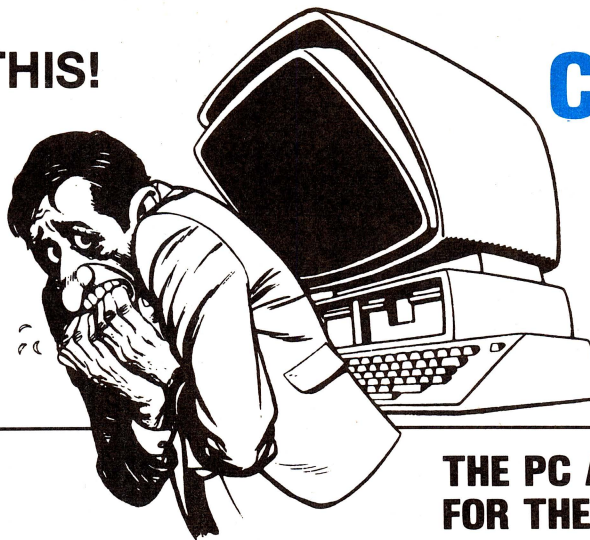
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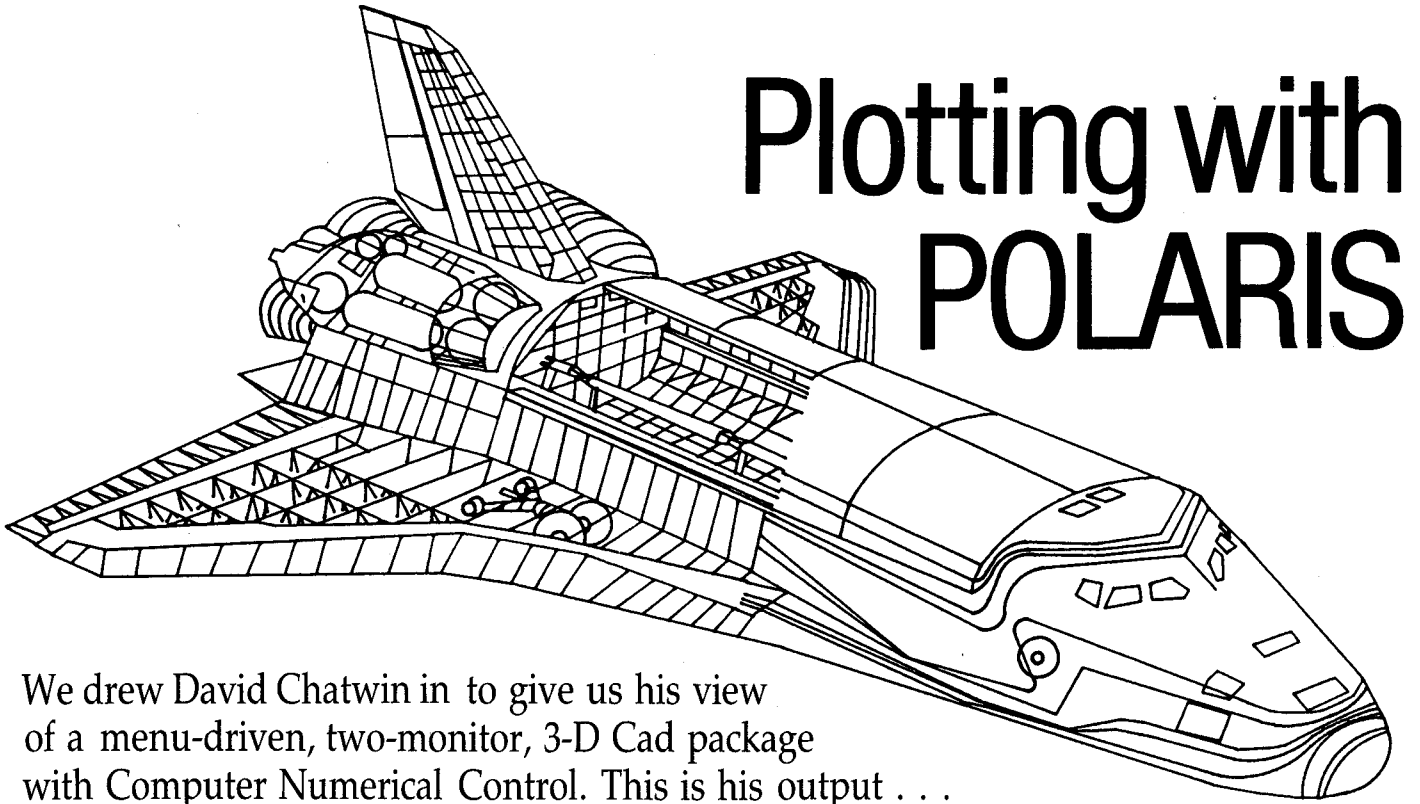
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Plotting with POLARIS

We drew David Chatwin in to give us his view of a menu-driven, two-monitor, 3-D Cad package with Computer Numerical Control. This is his output . . .

IT'S FINALLY happened: I've gone cross-eyed! Now before some of you start suggesting it has something to do with my habits, it's come about as a result of the latest package to hit my desk for review. The package in question is a Cad/cam package called Polaris. While I might be exaggerating about the cross-eyed result, this package does take a bit of getting used to since it uses two monitors for display purposes.

One monitor is used for displaying the graphics (or drawings), whilst the other is used for the input of commands and for text and numeric displays.

This product is more than a Cad package, as the manual says, it is really a Cad/cam system. It comes in two parts: the software (which is supplied on a floppy), and a display driver card that fits into a normal PC expansion slot. This card is more than just a display driver, as it also contains its own NEC 7220 processor which takes care of most of the numerous calculations and other hard work that Cad normally involves.

This means that the processor in the PC (be it a 8088, 8086, 80286 or whatever) is freed from those tasks that it wasn't designed for (like large calculations) and is left to do those things that it does reason-

ably well (like I/O handling and getting commands from the keyboard).

This approach also has the advantage of reducing the amount of code that is used, to the extent where the software occupies a minuscule 150 kilobytes on disk and the package as whole only occupies 415 Kbyte of RAM, including the drawing. This economy in the use of storage space is almost unheard of in the world of Cad packages.

Another definite advantage that arises from this system is that Polaris will quite happily run on a basic PC with one floppy drive (and no hard disk), though I am not sure that I would recommend it.

Installation

Installing the system is relatively easy. First you must fit the Polaris card into an available slot on your PC. The distributor *did* recommend that I use slot 1 on my PC, which involved moving my normal display card to slot 2 so . . . I found out the hard way that the card *must* go in slot 1, as strange things happen if it goes into slot 2. After installing the card, you should then plug in your two monitors. With the two screen approach, only one monitor needs to be a high resolution (EGA) type. The monitor that is used for entering commands can just be an el-cheapo mono-

Figure 1. If you want to draw in 3D, Polaris makes it relatively easy — the user has the choice of views of the object to be shown at the same time, or, having only the front, side, top or isometric view individually on screen.

chrome (or colour), low resolution garden variety monitor. This does present the opportunity to reduce the cost of having to use two monitors.

The next step is to copy the Polaris software onto your hard disk (or a floppy). Polaris is then started by entering Cad (very original filename that) when you are logged onto the appropriate drive and directory, after you have booted your computer in the normal manner. If you need to reconfigure Polaris, there is an install program that must be run, after which the file linker (LINK) is automatically run to link the object files that comprise the code.

Only two problems appeared with the installation (apart from the slot 1 and 2 problem) — the first was that Polaris did not want to work from drive D, but was quite happy with using drive C. This appears to be a hangup in the package - the distributor later informed me that *only* drive C can be used.

The second had to do with my HP LaserJet printer (a LaserJet Series II to be exact). For some reason, the laser printer did not want to start with the Polaris card installed in the computer. It would go through its usual self checking routines when turned on and then would just sit there saying 'warming up.' This could be a real problem in some locations, so make sure that your printer is compatible with Polaris before laying your money on the line.

Three-level Menus

Once you have started the package, the drawing monitor shows the drawing area, complete with an indicator at the bottom giving the X and Y directions. The text monitor presents you with a menu giving the current options, as well as a display that gives details of the current cursor position, and the last point set.

It might pay to mention here that the entire Polaris system is menu driven and after a while I found it to be just a little unwieldy. Each menu has a maximum of nine choices, numbered 1 to 9, and the menus run down to (normally) three levels. If you get your calculator out you will see that this gives you a maximum of 729 menu choices. Thankfully, not all these are used, with some menus only having a few options, which keeps the number of choices down to about 150.

In use, you would normally call on the mouse to highlight the menu option you want and click the button to select. (I found a bit of a problem here in that while my Mouse Systems mouse worked perfectly, my Microsoft mouse was very 'jumpy' and tended to skip over three or four options when the slightest movement of the mouse was made. What was even stranger was that both mice worked perfectly on the drawing screen, with the Microsoft mouse only misbehaving on the menu screen. It is also possible to select a menu choice by inputting its number from the keyboard.

Whatever method you use, once the selection is made you are moved down to the next menu level and when you reach the bottom, the system will ask you for whatever information is needed to carry out the selected operation.

If you are feeling very confident after a bit of experience with the system, then it's possible to shortcut the long menu system by inputting the complete list of numbers for a particular option. That is, to select option 1 from the main menu, then option 8 from the next menu and then option 2 from the third (and last) menu, you

can simply enter 182 at the main menu. Apart from the menu structure, I found Polaris easy to learn and quick to use.

Rather than cover all the detail on what the package can and cannot do, I will just present those areas where I feel it differs from the opposition — firstly, Polaris will run faster with a mouse than with a digitiser. Now, this might sound a little bit strange, but it is true. The actual speed difference is hard to quantify, as I found that it seemed to run quicker with my Mouse Systems mouse than with a Microsoft mouse.

One feature which I personally found annoying but which some people may like is that, for many operations, each drawing point needs to be entered twice. The first click on the mouse button will move the cursor to the nearest point already in existence, at which stage the package virtually says 'is this the point you wanted?' You then have to click a second time on the mouse button to confirm that this is indeed the point that you wanted. I generally found this to be more of a hindrance than a help, but then like I said, some people may like it.

One area in which Polaris is streets ahead of the opposition in that it is possible to leave the program, go back to DOS, run, say, your wordprocessor and return to Polaris without losing your drawing. In fact, you can take up drawing where you left off before. Also, it's possible to run DOS commands from within Polaris; this is very useful, especially when you have forgotten which directory you stored the last drawing in. This feature comes about because of the use of a separate processor with its own memory. (I have fond memories of my boss coming in to my area with the main monitor on my PC running Word and the graphics monitor displaying four space shuttles. It took him quite a while to recover and I'm sure he still thinks it was done with mirrors.)

The text inputting abilities are not outstanding, with very little choice in sizing or typeface available. In fact there is only one style (or typeface) of text available. Compared to (say) Prodesign II and other packages, the text inputting facilities are rudimentary. A nice touch, however, is the ability to either keep text in scale with the drawing when a zoom is done, or to keep the text its original size, so that it remains readable no matter the zoom factor.

Output from Polaris is restricted to plotting only, though I expect that those using this package would normally have a plotter to go with it.

3D with Four Views

Another area where Polaris works well is in 3-dimensional (3D) drawing. If you want to draw in 3D, Polaris makes it relatively easy, with the user having the choice of which views of the object he wants to see on screen at the same time. You have the choice of seeing the front, side, top or isometric views individually on screen, or of seeing all four views at once. The four view choice gives an excellent overall perspective of the object being drawn, and it is quite fun to watch lines being drawn in all four views simultaneously. The four view screen also allows you to see exactly where on the 3-dimensional object the line you have just drawn on (say) the top will wind up. If you have a need for 3D drawing/display capability, Polaris is worth considering.

Hatch Your Own!

The ability to define your own hatching pattern is another useful feature, as is being able to define a number of 'objects' as a group. This group can then be copied, moved and erased within the current drawing. A group differs from a library element in that it can contain more than one object and that it is only part of the current drawing and cannot be used in a different drawing.

When you are inputting co-ordinates for a drawing operation, such as setting a point, it is possible to enter a formula, rather than just a number. This means that you can input a delta-X of $100+(2.5*3.6)$ instead of getting out the calculator to work out and input 109.

The delete and trim options give the user an extensive ability to delete parts of a drawing, as well as to simply trim off those little bits of lines that always seem to wind up poking out where you don't want them.

One feature which I feel sure would be most useful to mechanical designers is the ability to move and rotate an area of the drawing. With this feature, you can draw two parts of (say) a mechanical device like a joint which has an arm protruding from it; the arm must be free to move within a certain area. You could then take the arm and insert it into the joint (on screen of course) and, using the rotate feature, rotate the arm into all possible positions to see if it has sufficient clearance from surrounding objects. This, of course, is only one possible use of the rotate option. I am sure that any imaginative designer could think of a lot more.

Dimensioning facilities are excellent, with the ability to dimension horizontally,

vertically, parallel to a line, from one base point or from each consecutive point and angles can also be dimensioned, as well as the radius and diameter of curves and circles. Text entries can also be added to a dimension, so that tolerances and so on can be specified when the dimension is drawn.

Only four line types are provided, which can be a bit of a restriction in complicated drawings, although I suppose you could use different colours if needed.

One very interesting feature of this package is its ability to work out a program for a numeric control cutting machine. This part of the package is called the CNC module, which stands for Computer Numerical Control (you all knew that of course). Polaris will let you take a drawing (say of a machine part) and you can guide it around the outline that you want to cut. As you guide it around, it works out the instructions needed to control the NCC machine and comes up with the required program, including any tool up and down instructions. Polaris will even simulate the action of the cutting head on the monitor, just so you can make sure you have done the right thing. If you want to, you can then edit the program before sending it off to your cutting machine. The other interesting feature here is that you can take an existing CNC program and load it into Polaris. The program can be loaded either from disk, or through an RS232 port.

As with most Cad packages, Polaris will read plotter files (both Hewlett Packard and Houston Instruments), so that getting a drawing across from another package should be fairly easy.

As an interesting aside, it appears that Polaris was originally developed to run on a Commodore 64 for the Israeli education department. It's a little bit mind blowing to think of all this power being available on a C64 but the distributor assures me that the story is true.

The manual is well written, though it seems to have suffered a bit in the translation to English, as some sections need to be read a couple of times before they make sense but it's certainly nowhere nearly as bad as some other translated manuals I have seen. The manual does lack an index but it is laid out in the same order as the menus within the package, with each section having the same number as the menu choice it refers to, so section 5.7 refers to option 7 on menu 5. The manual falls somewhere between being a reference document and a learning guide.

If a tutorial was added it would make an

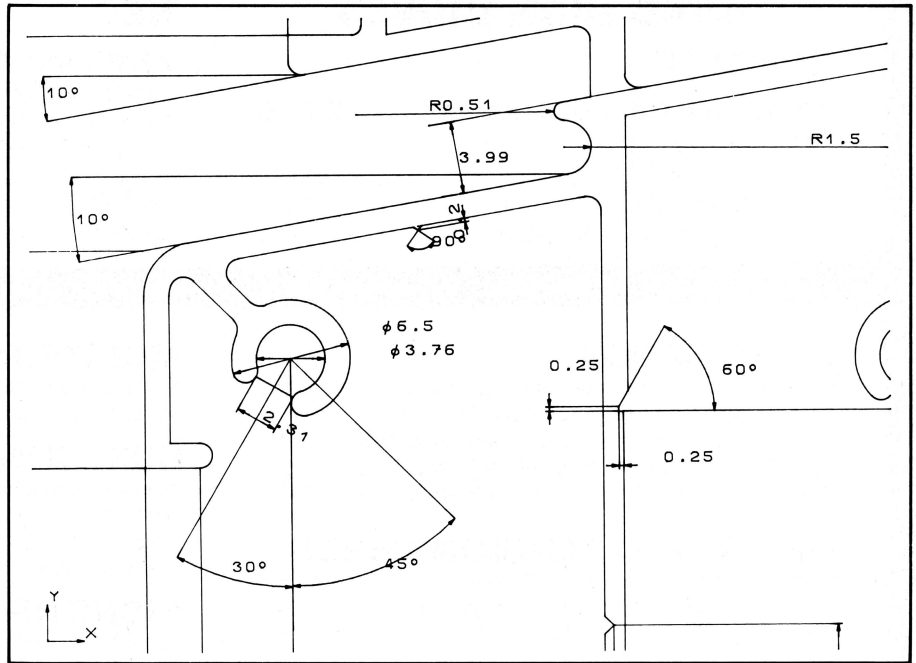


Figure 2. The dimensioning facilities with Polaris are excellent, with the ability to dimension horizontally, vertically, parallel to a line, from one base point or from each consecutive point, and angles can also be dimensioned, as well as the radius and diameter of curves and circles. Text entries can also be added to a dimension.

excellent learning guide and if an index were added it would make a good reference manual. Certainly, all the information you need to know is in there, it's just a matter of finding it.

I found Polaris very easy to learn, and after the first couple of hours use, I did not need to refer to the manual.

To me, Polaris is a fairly specialised package, which would be ideally suited to a manufacturing environment. It would not, for instance, be suited to the production of architectural or building drawings. However, I could see it being useful in a manufacturing or mechanical engineering company, especially those that have numerically controlled cutting machines.

While it has some drawbacks, they are minor compared to its advanced features in some areas and none of the drawbacks would be a problem in the area I mentioned above. Certainly its speed, regardless of the machine being used, is outstanding and the ability to run a Cad package on a plain ordinary PC may be just what some people are looking for. The flip side of this coin is the need to purchase an additional monitor, but this would not be too much of a burden with EGA monitors running at about \$950, and monochrome monitors only costing about \$300. The display/processor card will support monitors with resolutions up to

1024 x 1024 pixels, which is not bad in anyone's language.

And the Cost?

How much is all this power going to cost you? The current price for Polaris is \$5400 (including tax). This price also includes training and free upgrades as they come out. You would need to add the cost of additional monitor to this price, but even you had to buy an EGA monitor, the total cost would still be under \$6500. As this includes training and upgrades, it is not a bad price to pay for a package as powerful as this.

Polaris is not the sort of package you would buy if you just want to have a look at what Cad is all about, or if you want to produce building drawings. But if you are serious about implementing a Cad/cam system in your factory, it may be just the thing you are looking for. □

Product Details

Product: Polaris
Distributor: Elcomp Pty Ltd, 14 Whiteside Rd, Clayton South 3169 Victoria
 (03)561 2594
Price: \$5400 taxed (includes display driver card with NEC 7220 processor)

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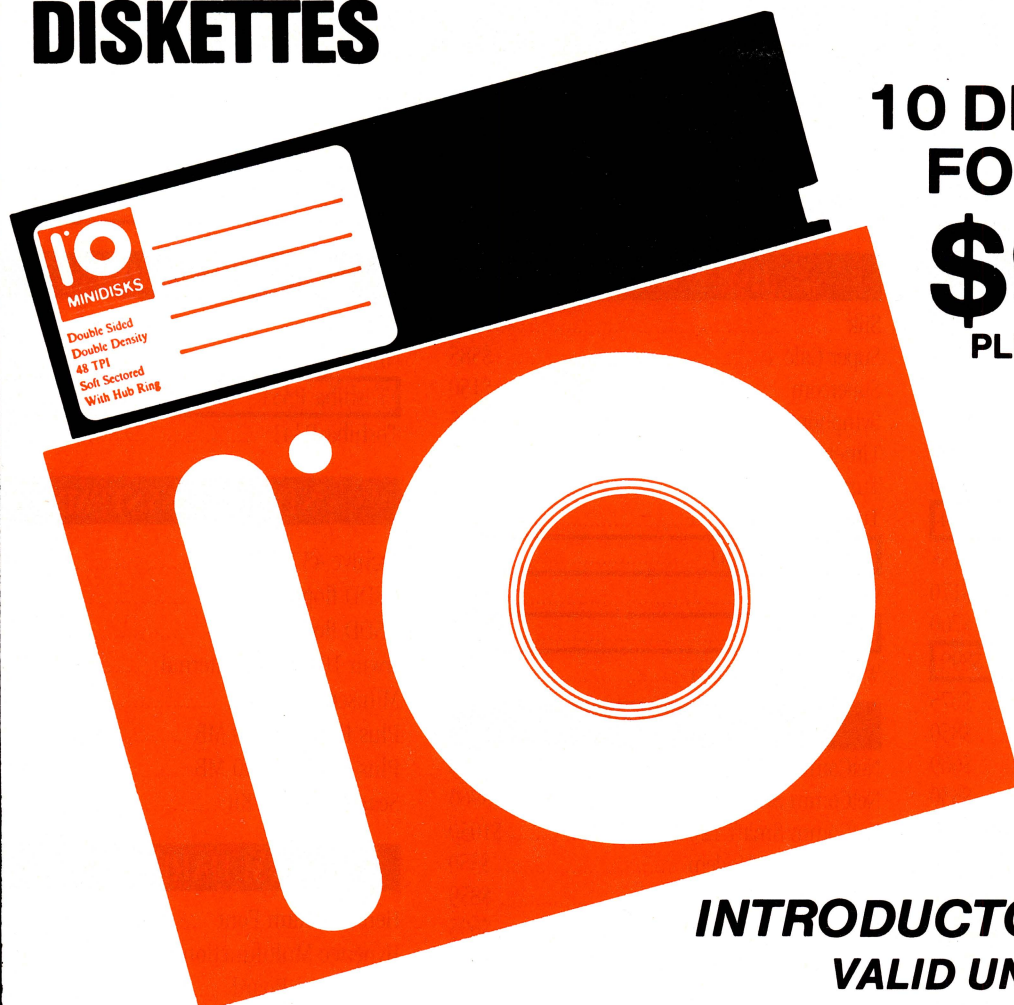
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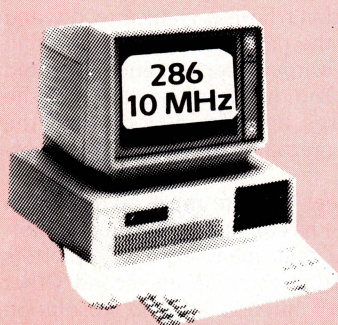
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CPU:	16 MHz 80386.
RAM:	2.5 MB 32 Bit wide RAM, expandable to 16 MB.
ROM:	IBM AT compatible.
DISK STORAGE:	1.2 MB floppy, one 40 MB High Speed hard disk.
EXPANSION:	One 32 Bit, three 16 Bit and two 8 Bit slots.

Kaypro 286i

CPU:	10 MHz 80286.
RAM:	640 KB expandable to 15 MB.
ROM:	IBM AT compatible.
DISK STORAGE:	1.2 MB floppy, one 40 MB High Speed hard disk.
EXPANSION:	Eight expansion slots.

Kaypro PC/PC30

CPU:	8.0 MHz 8088/V20.
RAM:	768 KB
ROM:	IBM PC/XT compatible.
DISK STORAGE:	2 x 360 KB/1 x 360 plus 30 MB hard disk.
EXPANSION:	Nine expansion slots.



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PLOTTING AND DOTTING

If you need a dedicated plotter, we've got one for your short list — and, if speed is paramount, we've got a printer for that short list, too.

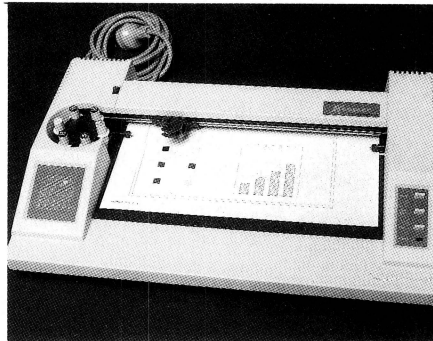
ONE OF THE essential pieces of equipment for effective graphics and computer aided design is a reliable graphics printer or plotter. If you shop around, you'll soon be amazed at the number of machines available: these range from low priced 'toys' to fast, versatile, clear-imaged plotters, costing around \$7000.

There are many points to look for in a plotter: the number of pens it carries, size of paper it can handle, the plotting speed, the type input and output ports, graphics emulation, the method of capping pens, how easy (and messy) will pen cleaning be — and: will it work with *your* computer and software: try it before you commit yourself. Of course, the most important feature is the quality of the output and whether it suits your purposes.

The Sweet-P 601

The Sweet-P is an affordable American manufactured plotter that gives good quality plots. It has six pens to select from; these are held in a simple but effective mechanism. The pens are automatically capped when they're returned to

their holders after use. Each of the six holders is numbered so that you can set the output text pen numbers to the colours you want.



The one problem with the pen selection on this machine is that the wheel turns slowly to bring the pens in reach of the plotter arm, which considerably slows printing if there's a need to change colours — and the wheel has a tendency to 'clank' as it turns. The other sounds the Sweet-P made while plotting was a bit of a 'clunk' as the plotting arm was raised and lowered and a 'whirring' sound as the paper was moved — this all makes the plotter sound noisier than it is — we only mention it as a general comment: most flat bed plotters make essentially the same noises — more 'notice-y' than 'noise-y.'

Drawings are done on a flat bed (as opposed to a drum), with the paper clamped down in the centre of the bed — A3 and A4 sizes are catered for. When plotting, the paper moves quite fast and is held firmly.

Flat bed plotting has the inherent advantages that the pens are always pointing down so the ink generally flows well (the tips don't have a chance to dry and clog) and the paper is kept relatively flat, avoiding warped paper (and distorted plotting). The disadvantages are that the plotter takes up a lot of room and the plotting mechanism is comparatively noisy.

The Sweet-P (there must be a story in that name) has an appreciably faster plotting speed than many expensive plotters — it's rated at about 36 cm/second. Other numbers of interest are the Resolution (also called 'smallest addressable step size' — it's basically a measure of the closest that two lines can be drawn together), which is given as 0.10 mm (about the middle of the range for plotters); and the rated acceleration for the plotting arm is 3Gs (again, about average — the higher the number, the less time you'll spend waiting for the plotter when it has a lot of tracking across the page to do).



Figure 1. You'll have to pay dearly for a plotter that can draw smooth curves — this sample from the Sweet-P (shown here at 4 times actual size) is quite acceptable for a plotter at this end of the market.

The Fine Line

The quality of the output from the Sweet-P is impressive considering the price — the lines were clear and straight and the colours were very full without bleeding at the edges.

There were, however, distinctive dots where the plotter would start and finish a line which can be a problem when you want detailed, presentable work. Also, the orange ink, for some reason, did not fill solid blocks of colour evenly; this

The Plot Thickens . . .

IN OUR MAY '87 issue we presented the last part of our Printers Feature which covered plotters — if you're in the market it would be worth looking at the reviews of the Comx PL-80 Plotter (distributed by Mike Boorne Electronics, (02) 46 3014); and the DXY-980 Plotter from Roland, (02) 982 8266. There's also a box item giving advice on buying plotter pens. □

was most likely just a problem with that particular ink cartridge.

The Sweet-P is new to Australia, so we were suitably impressed to see that it is mentioned in the set-up selection for Acad, the drawing package we use here for testing — this is an indication that there should be few software hassles with the plotter.

Centronics parallel and RS232 serial ports are both provided — the machine should plug straight in to most IBM-type computers. Selection of ports, transmission baud rates between the plotter and computer, and paper size are made using the DIP switches located at the back of the plotter. DIP switches also provide for selection between the two graphics options, either the Hewlett-Packard graphics language or software driven graphics.

Summary

If you are looking for relatively good quality output, but have no real need to pay for a professional quality plotter, then the Sweet-P should be on your short list.

Product Details

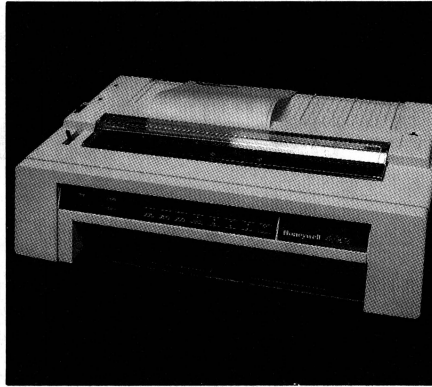
Product: The Enter Sweet-P 601 Plotter
From: Enter Computers, California USA
Distributor: Kenelec Pty Ltd, 48 Henderson Road, Clayton 3168 Victoria (03) 560 1011
Price: \$1650 taxed Plotter
 \$32 taxed Pack of 6 pens

The Honeywell Bull 4/66

Now for something quite different: For general office work (and at home), printing speed and noise tend to be the points users mention most often when asked something like 'are you happy with your printer?' And, if the printer has some sort of graphics and color capability, as well as being fast and quiet — what more would you want?

The Honeywell Bull 4/66 Printer fits all those criteria — with a bonus: there's no need to rethread the paper if you want to change from continuous paper to single sheets (in fact, paper changing on the 4/66 is about the easiest we've seen on any dot-matrix printer). In Europe, this feature was considered so nifty, the machine was voted Peripheral Product of the Year during the 1987 RITA (Recognition of Information Technology Awards).

The size of the printer, 18 cm x 63 x 41, is reminiscent of a large daisywheel and it's as heavy, weighing in at 20 kg — but that weight's needed to keep it on the desk while printing: this machine flies!



The 4/66 'sprints' out around 420 cps (characters per second) in draft mode (and that's well under what it's rated at). Unfortunately: at first glance it looked like Greek, and at second glance it was unreadable (the machine we looked at was 'factory new' — we can only hope this was a problem with this particular unit, and is not typical of the model).

This is an 18-pin printer, so we had expected much better results, even at that incredible speed. (For a general discussion on dot matrix printers, see 'Printers — Part I' in our May '87 issue).

The 4/66 can print out 17.1 character per inch in draft, (that means it will print 132 characters across on 80-column paper) — but, again, the quality is border-line: even 18 pins have trouble keeping up with the speed of the paper and printing head. Of course legibility increases as the speed drops down, but even in 'Quality' mode there were parts missing from characters. Also, letters like w, x and m and some of the graphic characters tended to fill in — but the speed was a very respectable 65 cps (measured; it's rated at 75). Compare that with a run of the mill machine's 20 to 30 cps in Near Letter Quality mode.

If we bear in mind that Honeywell's traditional area is mainframes and peripherals to suit, that partly explains the high-speed/low-quality results we obtained. Make no mistake, if speed is paramount, then the 4/66 should be considered, particularly for mundane and time-consuming tasks like printing invoices and stock lists (or a few thousand lines of code). In Double Strike or Quality modes, the machine is still *very* fast and the result is readable — the head just needs a second pass to keep up.

The printer comes equipped with dot, line and mosaic graphics as well as the IBM character set. Dot matrix graphics ranges in resolution from 60 horizontal x 72 vertical dots per inch (dpi) through to 240 horizontal x 72 vertical. The 4/66's graphics are flexible — each pin is programmable, so custom fonts and characters can be designed — but suffer the limitations of dot-matrix printing, as opposed to laser.

Printing modes, including draft, each have emphasized, double strike, double width, italics, subscript, superscript, and underline. Additional fonts are available through cartridges which fit in the top left of the printer, underneath the tractor feed cover. There are only two fonts available per cartridge, however.

Draft mode

ABCDEFGHIJKLMN OPQRSTUVWXYZ [

17 cpi mode

ABCDEFGHIJKLMN OPQRSTUVWXYZ [] ' ' a b c d e f g h i j k l m

Quality mode

ABCDEFGHIJKLMN OPQRSTUVWXYZ [

Figure 2. Three samples from the Honeywell Bull 4/66.

The Control Panel

The control panel has the no-nonsense look of a mainframe machine — there's no pastel consumerism here. Easy to follow indicators and a four-character display show the operating state of the printer, while a touch-sensitive panel is used to change it.

Conclusion

If speed is what you're after, especially if it's coupled with a flexible, heavy duty printer capable of four-colour graphics (albeit, rather limited in scope), and you can justify the price — the 4/66 is a machine you'll probably still be happy with five years from now. □

Product Details

Product: The Honeywell Bull 4/66 ???
From: Honeywell-Bull Australia, 124 Walker Street, North Sydney 2060 NSW (02) 923 9660
Price: \$4500 Printer; \$900 Sheet feeder; \$300 Serial interface; \$90 Font cards (two fonts per card). (All prices taxed.)

Graphics Techniques

— the Fundamental Concepts

COMPUTER TECHNOLOGY is a tool which extends the abilities of our bodies and minds. With it we can 'build' simulated objects and manipulate them at will by using various computer procedures or algorithms. These techniques, making possible the amazing graphics we have all seen on expensive machines, have recently become available on computers within reach of the home user.

This 'graphics revolution' has been sparked off by a number of developments — first of all, the cost of video hardware is plummeting as a direct result of the falling cost of RAM (Random Access Memory) chips. This has made high resolution graphics more readily available to the average user.

More importantly, however, there is the increasing emphasis on user friendliness and the more natural it feels to use a computer, the greater is its effectiveness as a design and analysis tool. It seems that the more transparent the system, the better results users can get from it.

This software push has in turn caused a rapid development of faster and higher resolution video technology and so the cycle of better hardware and software continues. You can expect that high speed, TV quality scenes will soon appear on your computer monitor — if they haven't already.

Video Display Technology

To gain an understanding of how graphic software procedures work, it's necessary to examine how the computer display system works. The way the computer is wired (the hardware), determines the types of manipulations that are possible with the software.

For example, we must keep in mind that the image is updated for display at a predetermined rate, usually 25 times a second — any slower than this and animated sequences 'flicker.'

We've all seen computer graphics — but how is it done?
In the first of a new series, Miroslav Kostecki explains
the basics of your computer's graphics system.

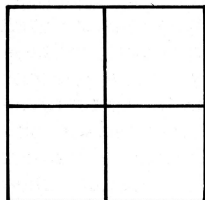
```
10 '      ### DRAW LINE ###
20 ' # Miroslav Kostecki # August 1987 #
30 'draws line from point a,b to c,d
40 'distributed as evenly as possible
50 'using only plots
60 '
70 'use integer variables
80 DEFINT a-z
90 GRAPHICS PEN 1
100 CLS
110 a=100: b=100
120 c=600: d=205
130 GOSUB 180
140 '
150 END
160 '      draw line between points a,b and c,d
170 '
180 u=c-a: v=d-b 'distance along and up
190 dlx=SGN(u): dly=SGN(v) 'diagonal direction
200 d2x=0: d2y=SGN(v): m=ABS(v): n=ABS(u)
210 IF m<n THEN d2x=SGN(u):d2y=0: m=ABS(u):n=ABS(v)
220 '      m is the larger of abs(u) and abs(v)
230 '      and n is the smaller
240 s=INT(m/2)
250 '
260 FOR i=0 TO m
270   PLOT a,b
280   s=s+n
290   IF s<m THEN a=a+d2x: b=b+d2y: GOTO 320
300   s=s-m
310   a=a+dlx: b=b+dly
320 NEXT i
330 RETURN
```

Listing 1. A Draw Program using the algorithm in Figure 3. The program tests to see if it is taking the shortest path from the starting pixel, to the finish.

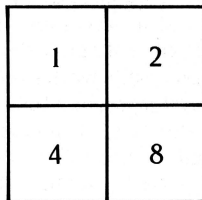
Block Graphics

Early displays were based on blocks of dots forming character symbols — the familiar text screen. This has generally been extended, so that in the full IBM character set, for example, we now have 255 different symbols; these are defined on 8 dot by 8 dot squares and stored in permanent ROM in the video electronics. These symbols include the alphabet (upper and lower case), lines, shapes and blocks of shading.

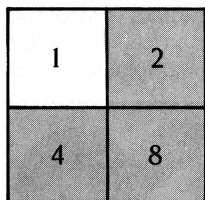
The display screen is usually divided into 80 blocks across and 25 blocks down, giving a possible 2000 characters displayable at once. The graphics systems stores the character codes in RAM (1 byte per code); each of these 2000 bytes can be accessed and changed by computer programs and procedures.



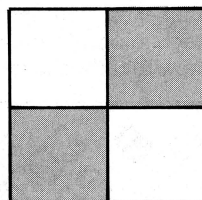
All 4 quarters are blank, so the graphics character code is 128.



Each quadrant is given a value for a 'dot' in that quadrant.



The new character code is 128 (blank) plus the values of the dots —
 $128 + 2 + 4 + 8 = 142$



Here, the character code is —
 $128 + 2 + 4 = 132$

Figure 1. Block graphics on a text screen.

A common method of using a text screen to display dot graphics, is to use graphic symbols which are divided into quarters. Each quarter can be either black or white, resulting in 16 possible symbols for each character position.

The blank symbol is given a certain set character code (128 in the IBM set) and each quadrant is given increasing values of 1, 2, 4 and 8. When a dot is added to a certain position, the new character code is

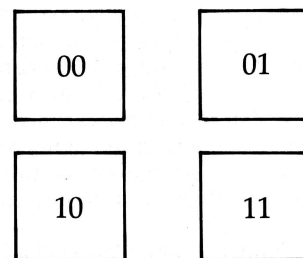
arrived at by adding the value of the quadrant — see Figure 1.

The use of graphics symbols among text has made possible graphics transfers over modems — this technique is used by videotex systems like Viatel because it is very conservative with respect to the number of bytes needed to create a display.

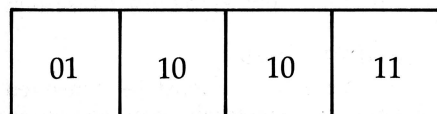
Another advantage over newer types of displays is the quick manipulation of characters on the screen. Only 1 byte in memory must be changed to change a whole character.

Dot Manipulations Onscreen

Graphics is normally displayed on what is called a memory-mapped or graphics screen. Here each dot (pixel) is held in memory and can be accessed and changed separately. This means any pixel can be set on or off at any position of the display which makes the graphics much more flexible. Figure 2 shows how the pixels are stored in groups to form bytes of screen memory.



Four colour pixels, each with its own binary code.



These are stored in the display memory as an 8-bit byte. Each byte is displayed on the screen in sequence to give the 'picture.'

Figure 2. Pixels on a memory-mapped graphics screen.

```

10 '          ### FILL ###
20 ' follows the left and right edges
30 ' # Mirosław Kostecki # August 1987 #
40 '
50 MODE 1: DEFINT a-z
60 GRAPHICS PEN 1'border & 10 random lines
70 MOVE 0,0: DRAW 0,398
80 DRAW 639,398: DRAW 639,0: DRAW 0,0
90 FOR i=1 TO 10: DRAW RND*640, RND*400: NEXT
100 '
110 GRAPHICS PEN 2
120 m=2 'size of pixel
130 x=320: y=200 'start position
140 GOSUB 180 'fill x,y
150 '
160 END
170 ' fill subroutene
180 c=TEST(x,y): a=x
190 ud=-2: tx=x: ty=y
200 WHILE a<=x
210 WHILE TEST(a,y)=c: a=a-m: WEND: a=a+m
220 WHILE TEST(x,y)=c: x=x+m: WEND: x=x-m
230 MOVE a,y: DRAW x,y
240 y=y+ud
250 WHILE TEST(x,y)<>c: x=x-m: WEND
260 WHILE TEST(a,y)<>c: a=a+m: WEND
270 WEND
280 IF ud=2 THEN RETURN
290 ud=2: x=tx: y=ty+ud: a=x
300 GOTO 200

```

Listing 2. A Fill Program illustrating one simple algorithm for coloring a 'block.'

An extension of the simple memory-mapped screen is a palette system for storing shades and colours. With this system, a number of colours are taken from a particular table and stored in memory.

For example, you might be working in a resolution that allows for only 4 colours on the screen at any given time. If, say, there are 27 colours in the table, you can use all the colours but not at the same time. The 4 colours you choose may be changed at will.

The unlimited manipulation of adjacent pixels on a memory-mapped display system has enabled graphs, spray effects and textures to be applied to the video screen.

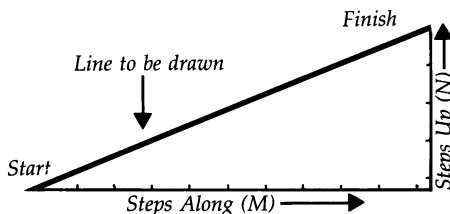
Drawing Lines

To draw a line, it must be converted from the continuous form we see on paper into a sequence of discrete pixels that can be displayed on a monitor. Of course, the line's final representation should resemble its intended form, looking like a straight line with consistent width and accurate position.

Early line drawing algorithms used a horizontal and diagonal lines approach. These were easy to implement and were fast but they were also very restrictive. The algorithm now widely used to draw lines is presented in Figure 3. In a nutshell, the process tests to see if it is taking the shortest path from one pixel to the next. Study the diagram and then try the Draw Program in Listing 1 yourself.

If you use low resolution displays, you

will have notices 'jaggies' or stair-stepping to the sides of lines. A technique for reducing this effect, called 'anti-aliasing', is to vary the brightness of the line with less bright neighbouring pixels. As a result, lines and edges will look nearly continuous and may even appear to have more precision than the resolution of the screen.



- 1) Let S be $M/2$.
- 2) Move along 1 step.
- 3) Now, let S be $S + N$.
- 4) If S is now greater than M , then
 - a) Move up 1 step.
 - b) Let S now be $S - M$.
- 5) Loop until the line has moved M steps.

Figure 3. The algorithm commonly used to draw a line.

One of the uses for lines used this way is to greatly speed up plotting shapes. As an example, imagine plotting a circle using only discrete pixels — you need to plot points close enough for there to be no gaps. However, if you use lines you need to calculate a point for only every 2 degrees of the circle and then draw lines

between them. In most cases, this gives an indistinguishable result but it's many times faster.

Filling Areas

A block of colour can easily be created by drawing layers of horizontal lines but a universal fill algorithm to fill any set shape greatly simplifies programming.

The Fill Program in Listing 2 illustrates one simple algorithm. The left and right edges of the block are found by testing the dots along each direction and a horizontal line is drawn between them. The next line down is then similarly tested and drawn until the left and right edges meet. Then the process is repeated going up. This results in a fast algorithm — but it will not work for concave shapes and may even erase parts of them. Careful placing of the starting position will enable the user to fill a complex shape with few starting points.

More complex fill algorithms are used to fill a shape with a certain pattern. These programs work similarly but refer to a look up table when they apply the points to the screen. Masking can be achieved with single colour fills to obtain areas of textures — first, create a block of texture, then apply an outline in a certain colour; then filling to the edge of the outline colour leaves a textured shape.

I hope these insights into the basics of your computer's graphics system has launched you into graphics processing technology. In the next article, I'll explain how to turbocharge slow graphics. □

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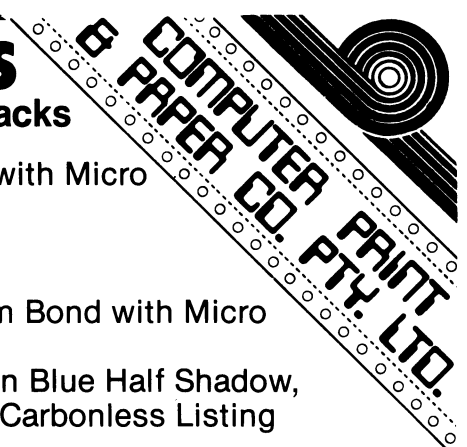
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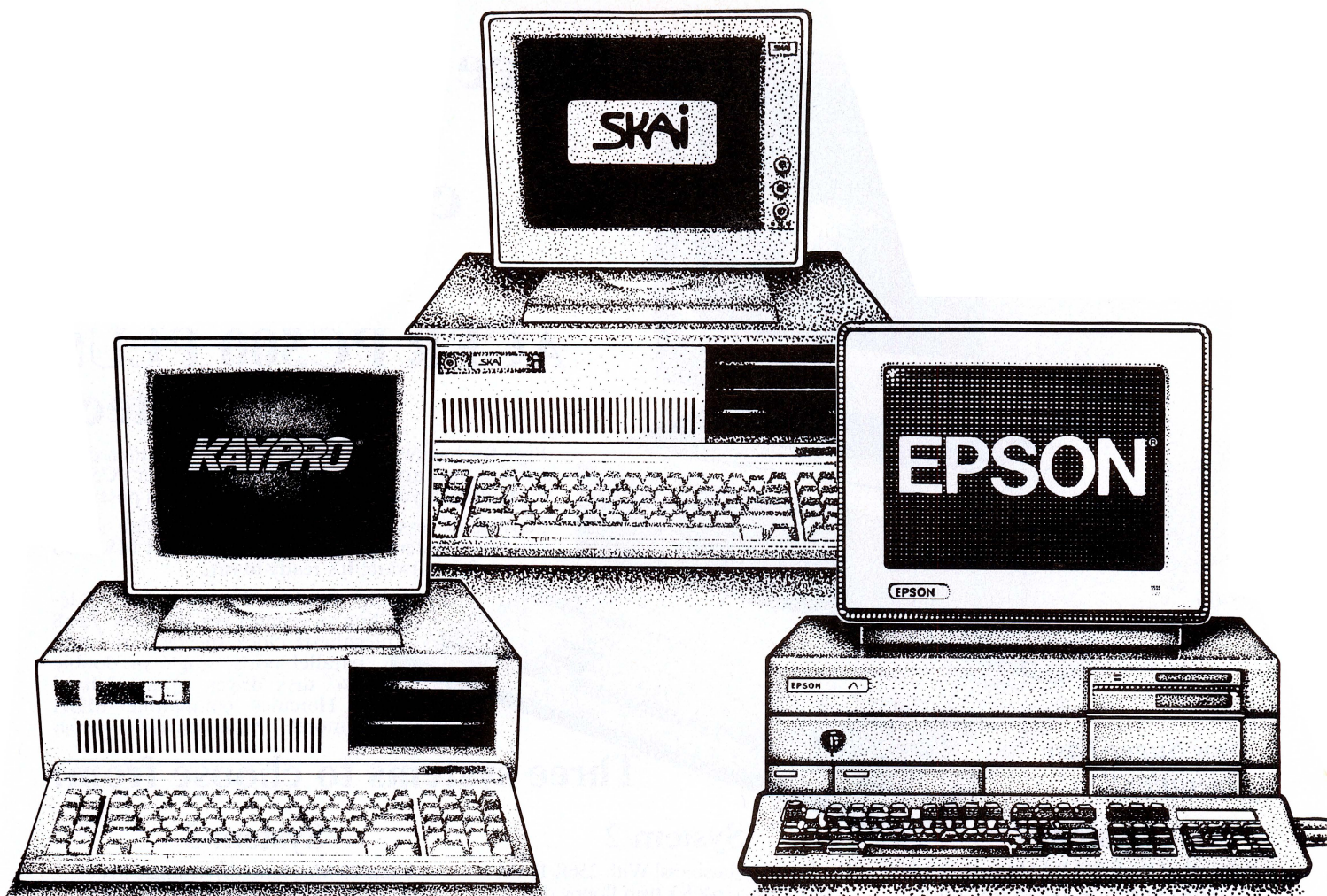
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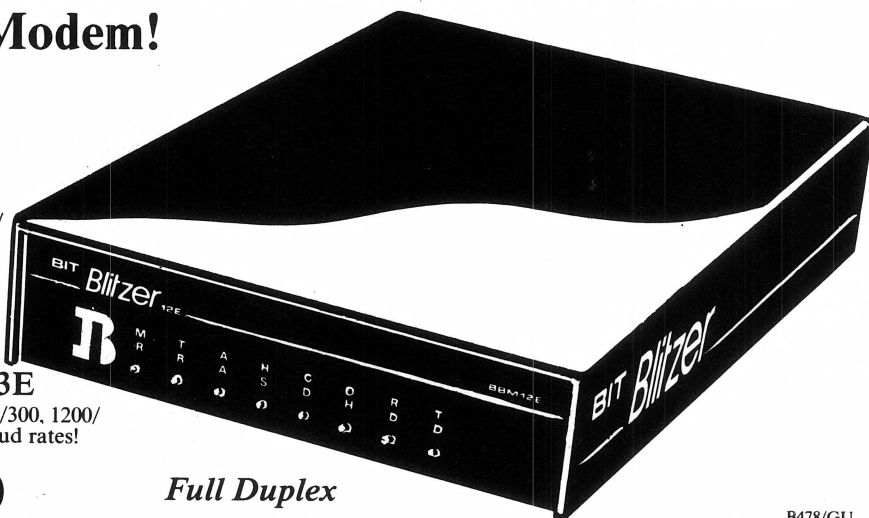
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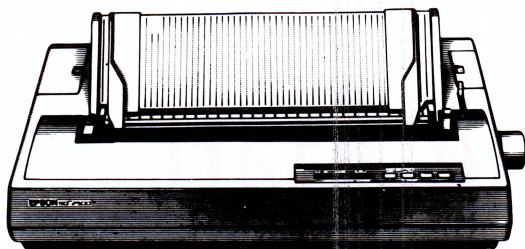


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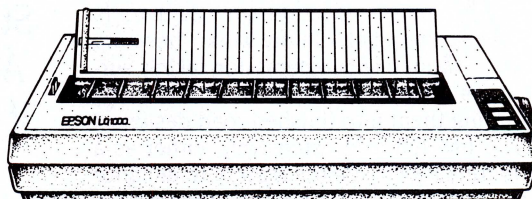


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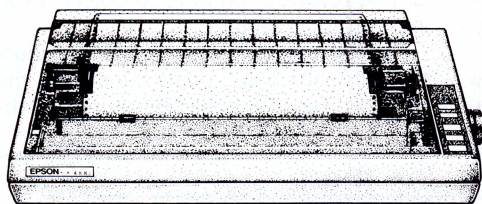
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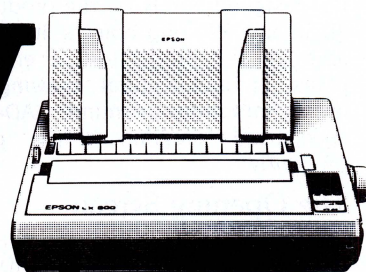


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CAD-3D for the Atari

AS A CIVIL ENGINEER, I use computer aided design (Cad) tools frequently in my work. These are mainly programs for taking surveyors' field observations and ultimately turning them into finished road designs. I also use Autocad extensively, either as a drafting tool in its own right or to enhance the output of the survey and road design programs.

Autocad is a massive program, occupying nearly a megabyte on the IBM and costing over \$5000. However, until the recent release of Version 2.6, its 3D abilities were severely limited. With this background, I was intrigued to hear of Tom Hudson's package CAD-3D for the Atari 520-ST. Could a program costing only \$80 or \$90 compete with the likes of Autocad? Could it provide a real 3D design tool?

Well, the first answer is no: CAD-3D is not a competitor for Autocad and is in reality a very different type of program — it's designed purely for the production of 3D images of solid objects. It is *not* suitable for the production of engineering plans or architectural drawings. With these limitations in mind, CAD-3D is a specialised program which performs brilliantly.

The Opening Screen

The package is supplied on a single-sided disk containing the CAD-3D.PRG and RSC files, together with the animator folder and support programs. There are also a couple of example picture files — this disk is full! There is no room even for a Desktop-Inf file. Luckily, the program is not copy protected, so the user can make a backup disk containing only the files that will be used. However, picture files will need to be stored on a separate disk.

The opening screen of CAD-3D is a standard GEM desktop fully occupied by four windows labelled Camera, Top, Front and Right. Unlike standard GEM windows, these can not be resized or moved around but the Camera window can be blown up to full screen size. Low resolution mode is not available, only medium and high.

In order to create an image, a number of pre-formed objects are used or you can 'roll your own' using the Spin and Extrude

Stunning three-dimensional graphics for under a \$100?
As a heavy user of Autocad, Paul Fisher wanted to see if CAD-3D could provide a comparable 3D design tool.
He reveals all . . .

tools. The pre-formed objects are cube, sphere (in three degrees of smoothness), wedge and torus. Selecting any of these from a drop-down menu will result in a perspective view of the object appearing in the Camera window. Opening the other windows will show standard orthographic projections of the image.

The relative dimensions of the object can be altered by using the scroll bars in the top, front or right view windows. A sphere can easily be stretched into a football, for instance.

The scroll bars on the camera window perform a quite different function. In the

default mode, the horizontal bar controls the zoom function (which operates just like a zoom lens on a camera) and the vertical bar controls perspective. By exaggerating the perspective, quite spectacular views are possible, giving a feeling of massiveness to quite simple objects.

By clicking on the Close Window box, the Camera window's scroll bars are toggled to control the viewpoint. The view can be revolved around the object, viewing it from any angle.

The Extrude tool acts just like an industrial extrusion plant. Using the mouse, the operator draws a cross section of the ob-

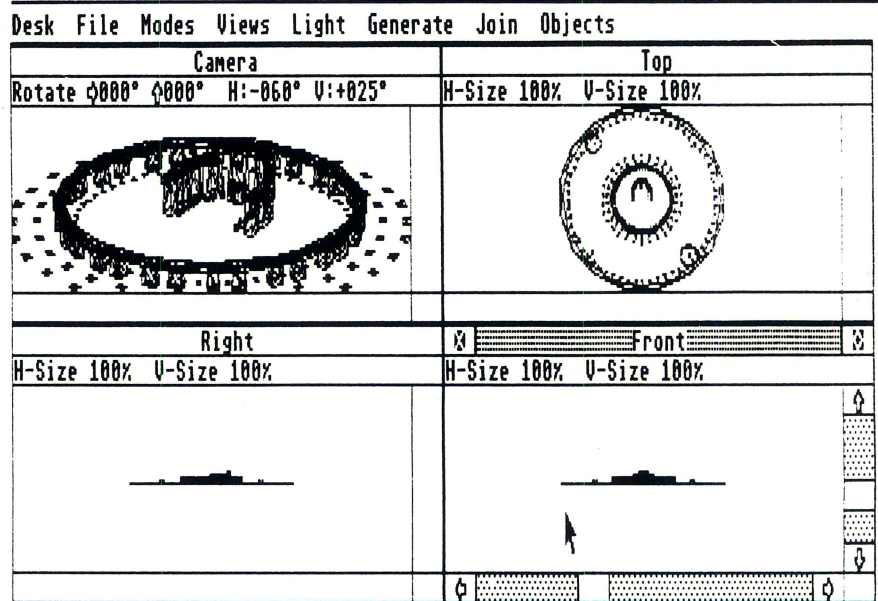


Figure 1. The opening screen of CAD-3D is a standard GEM desktop fully occupied by four windows, labelled Camera, Top, Front and Right. Unlike standard GEM windows, however, these can not be resized or moved around but the Camera window can be blown up to full screen size.

ject, then 'extrudes' it to a pre-determined length. The sketching process is made easier and more accurate by overlaying a grid on the screen and optionally 'snapping' points on the cross section to grid points. One minor difficulty with Extrude (and also with Spin) is that the cross section may only be drawn in a clockwise direction and lines may not cross each other.

Spin acts like a lathe and allows the creation of rounded objects of great complexity. The obvious example (which is illustrated in the documentation) is a wine glass. As with the Extrude tool, Spin requires a cross section (actually only a half a cross section, as it is mirrored) to be drawn using the mouse. The section is then spun to create the solid object. The user has the option of controlling the degree of smoothness of the finished object. Increased smoothness is achieved by increasing the number of planes generated; of course this uses more memory and also slows the process to a crawl.

Creating Shapes

One of my few gripes about CAD-3D is that the spinning of complex shapes takes a very long time — at first I thought the program had crashed. It takes even longer to join objects. However, when you realise the amount of number crunching required to achieve the finished article, it does not seem such an unreasonable wait.

Having created shapes, either by extruding or spinning them or by using pre-drawn spheres and the such like, it's possible to illuminate them using up to three spotlights and a diffused 'ambient' light. The careful manipulation of the lights — number, direction and brilliance, together with view point and perspective, can drastically alter the appearance of objects.

Although the camera window gives a reasonable view of your object, an alternative 'superview' is available. This occupies the whole screen, and shows the object (or group) in shades of colour on a black background — most impressive. Colour may either be 14 shades of 1 colour, or 7 shades of each of 2 colours. (Shades of grey are used in the high resolution mode).

Objects may be depicted in wire-frame format, as wire frames with hidden lines removed, as solid objects or solid objects with the edges of each plane outlined. This last mode gives the most realistic appearance but does take longer to calculate and display.

It is possible to join a number of basic objects to create shapes which are not otherwise possible. For instance, a chess

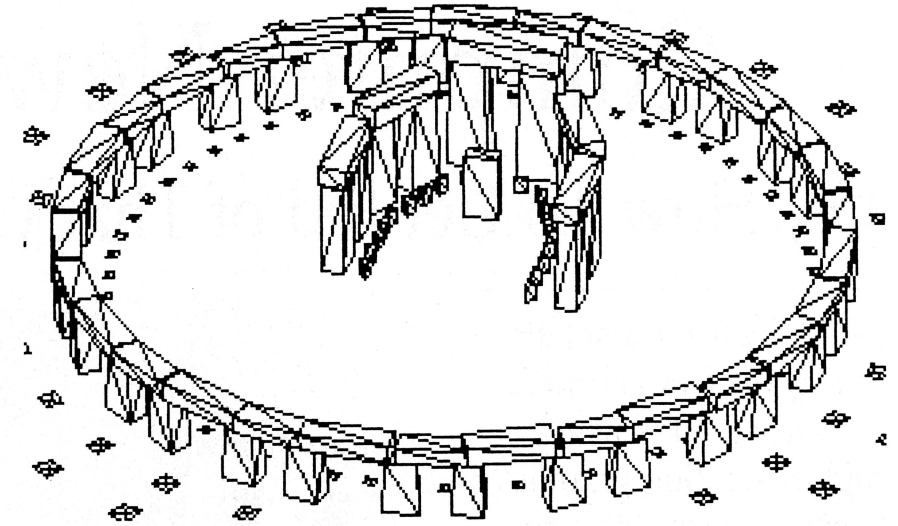


Figure 2. The masterpiece on the distribution disk is Stonehenge — a complete 3D model of the famous neolithic monument. When viewed backlit with blue light, this is truly a remarkable image. It is all the more remarkable in that your viewpoint can be moved right inside the circle of stones.

knight can have a spun body joined to an extruded head, with distorted wedges for ears. The proportioning of the various objects to ensure a proper fit on joining is a matter for considerable trial and error but worth the effort in the long run. (Speaking of long runs, joining objects takes even longer than spinning them.)

The documentation consists of a small paperback manual written in a very friendly conversational style. It is certainly not intimidating but is to brief and does not always cover all aspects of some complex operations in sufficient detail. (Compare this to the massive tome which accompanies Autocad.)

In addition to the program files, the CAD-3D distribution disk contains a number of ready made images. These include the Antic software logo and a stylised word Start. However, the masterpiece on this disk is Stonehenge — a complete 3D model of the famous neolithic monument in deepest, windswept England. When viewed backlit with blue light, this is truly a remarkable image. It is all the more remarkable in that your viewpoint can be moved right inside the circle of stones.

Animation

CAD-3D has an animation facility, but quite frankly it is probably not worth the trouble. The user is required to create a series of images then record them one-by-one onto an animation file. Normally, this would consist of recording a series of views of the same object, to gain an impression of movement. The animation

program then shows the views one at a time, like a slide show.

A second animation program can take images in Neochrome format, and display them one after another. With a lot of memory and a ram disk, this becomes a proposition (Oh for a Mega!!)

It is worth mentioning at this stage that a second version of CAD-3D — called CAD-3D II — has been released with much improved animation facilities but requires too much memory to run on an unexpanded 520 ST.

CAD-3D is a program which takes a lot of practice and effort to achieve results, but having reached a reasonable level of proficiency, the user can turn out some positively stunning graphics. □

Product Details

Product: CAD-3D for the Atari

From: Antic Publications, Honeyvale, California

Review Copy from: Computer Oasis, 37/406 Stirling Hwy, Cottelsoe 6011 WA; (09) 385 1885

(Note: There is currently no Australian distributor for CAD-3D, but many dealers are importing it on their own — check with your local dealer. Computer Oasis also stocks the latest version, CAD-3D II, which lends itself more to animation than the original version of CAD-3D. CAD-3D II is available for the Atari 1040.)

Price: \$89.99 taxed (CAD-3D), \$199 taxed (CAD-3D II)

Computer New Faces

Or, How To Get Rid of That Unsightly Bump

A Melbourne cosmetic surgeon Tim Hartnell discovered is using high-resolution graphics and an arts software package to 'redesign' people.

AMELBOURNE cosmetic surgeon has found high-resolution computer-generated graphics, and an arts software package, are potent tools in helping him give his clients the new noses, breasts and bottoms they desire.

'The traditional way of determining such things as the kind of nose shape desired was to do little sketches and then just talk to the client,' the Brighton surgeon said.

'However, the big problem here was that the kind of final result which I imagined the client wanted and the result which the client had in mind, could be quite different. The computer equipment I bought has removed this ambiguity.'

Hi-tech Love Affair

You'd suspect a love affair with hi-tech when you first enter this surgeon's waiting room. A television set connected to a video recorder is in one corner and a ghetto-blaster pumps away in another.

The surgery is akin to the demonstration room of a particularly classy computer showroom. A video camera, complete with spotlights, a very high resolution monitor, an AT-compatible with hard disk, a graphics tablet complete with stylus and a hi-res screen-dump photo-printer all jostle for space.

'The heart of the system is a WYSE-286, an AT-clone, fitted with a Truevision Advanced Raster Graphics Adaptor (TARGA)



board made by AT&T,' the doctor explained.

'The software I use, Truevision Image Processing System (TIPS), is designed to work hand-in-glove with this board. This is basically a graphics package; it is not designed specifically for medical use. I bought the software and the TARGA board in America, because I considered it was exactly what I needed. And once I'd set it up here in Melbourne, I discovered I could have bought the whole lot in Australia from a company called Vision Control in Melbourne.

'I also bought the Mitsubishi copier (which produces the high resolution screen dumps) in the States, along with the camera,' he said.

The TARGA board and TIPS software are designed to allow any PC compatible computer to capture digitised images from a video camera, VCR, videodisk or other composite video source. Then the keyboard, mouse, or graphics tablet with stylus can be used to modify these

Figure 1. The WYSE-286 PC fitted with a Truevision Advanced Raster Graphics Adaptor (TARGA) being used in a Melbourne surgery for 'design' work.



Figure 2. The 'before' shot (on the left) was taken with a video camera; the image was digitised and saved to disk, then duplicated in two windows. The after image (right) was formed by sampling the background color and using that to paint over the edge of the nose until the desired shape was achieved.

TAILOR-MADE CAD.

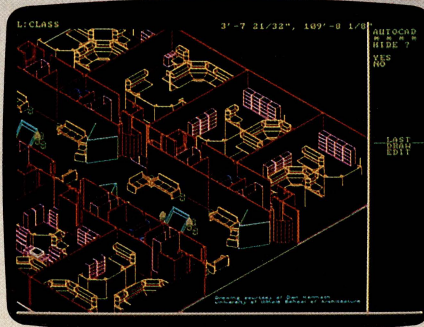
Compared to AutoCAD, the others just don't measure up.

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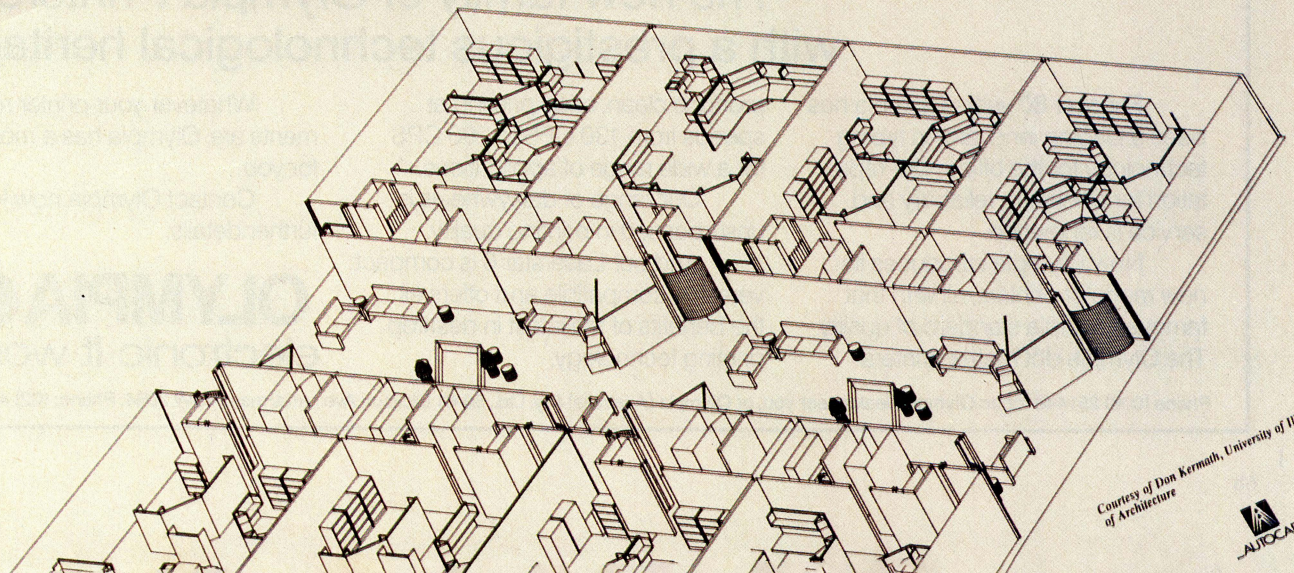
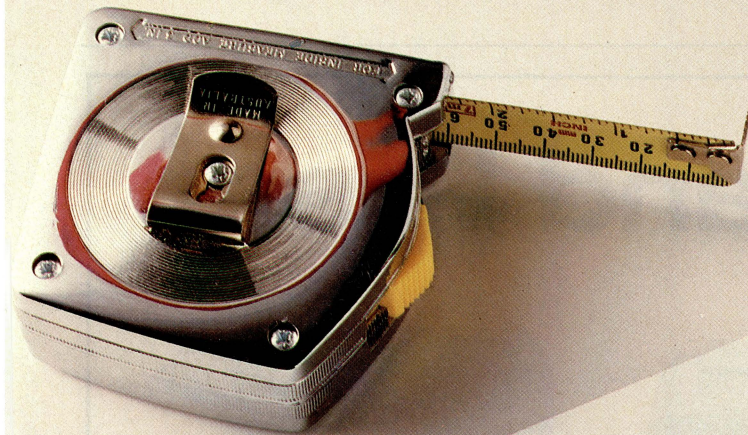
For all this you may think that AutoCAD would be expensive. Not at all. AutoCAD performs about 90% of mainframe CAD tasks. With over 100,000 users world-wide, including 2,500 in Australia, AutoCAD is now the standard for all CAD systems.



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images, changing the colours, shapes and so on and add text.

As far as he knows, this setup is the only one being used by a cosmetic surgeon in Australia, although the system has been put to other uses.

'BHP have a system, although I don't know what they're using it for and I understand at least one Australian police force is working with it to produce an up-to-date version of the old IdentiKit system.'

How It's Done!

So how do all these hi-tech goodies combine to give you the perfect nose or bum?

'I start up the equipment and select the TV option from the menu board in the graphics software. Then, I put the patient in front of the video camera and more or less 'take a photo' of the part of the body I'm going to be working on. So, if it is the nose, I take a shot in profile, or a back view of the lower half of the body for the hips, and so on.

'When I have the image I want on the screen, I save it on hard disk, then split the

screen into two windows and duplicate the image in both halves. This allows me to manipulate one image, while I leave the original image to the left of it for comparison. To change the shape of a nose for example, I get the computer to sample a bit of the background colour, and then simply 'paint' over the edge of the nose with this background colour until the patient and I agree on the shape we want. I can also do such things as improve the shape of a chin, neck or ears in the same way. People's eyes light up once they see what they can look like.

The doctor had one patient, a male, who had a scar on his face which made him very self-conscious. To show him how he would look without the scar, the doctor used the software to sample the colour of his face and then painted that over the scar.

'It was incredible to see his reaction. It was the first time he had been able to look at his face in his entire adult life and not see the disfigurement. I use the same approach, of sampling a bit of flesh tone and then painting with it, to erase frown lines

and other wrinkles,' the surgeon said.

According to the doctor, the best thing about using such a setup is that both he and the patient can be sure they are talking about the same thing.

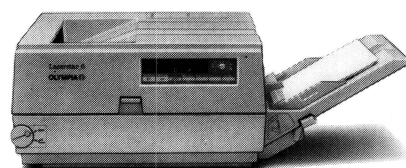
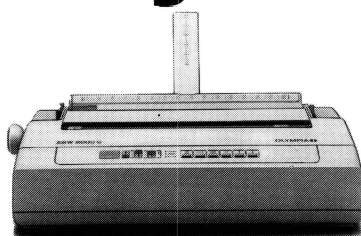
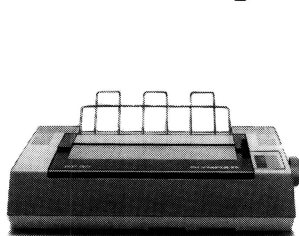
'Rather than having to use phrases like I want my nose to be less prominent we can work out exactly how it should look on screen and agree on a shape before any surgery gets underway,' he said.

The doctor usually gives a patient who is enquiring about possible surgery a printout of the split-screen images, with the before and after shots, so they can take it home to study.

'In the old days, even if we used photos, and sketched changes directly on to them, it could take a week before we had photos we could use and the sketches were far from being satisfactory,' the doctor said.

So, if you've got crows feet from staring at your VDU for too long, your posterior has been buffeted from its youthful perfection by sitting for ages at your keyboard, or you'd just like new hips, breasts or a change of nose for the summer, hi-tech wizardry is waiting to help. □

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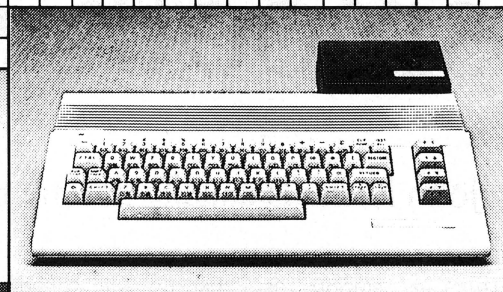
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SILK

...a smooth spreadsheet

John Nicholls usually doesn't take much note of hype, but —

NOTHING runs as smooth as Silk... 'Silk is a software masterpiece; Silk is Lotus Version 3.0; Silk stands alone as an extraordinary and ingenious spreadsheet product that will transport you to a new, higher level of power and performance.'

These are the some of the modest claims from the publishers of Silk — 'over 40 man-years in its development.' Whatever my feelings about all this hype, I must agree with some of it: Silk is 'an extraordinary and ingenious spreadsheet.'

Silk runs on an IBM, Compaq or compatible computer and requires 512 kilobytes of RAM (440 Kbyte after loading DOS), not an unusual requirement these days but it does make 640 Kbyte almost mandatory and even then limits the size of your spreadsheet; memory permitting, the maximum is 256 columns by 2048 rows (524,288 cells).

It can run on a 2 floppy disk drive system but really needs a hard disk. It can take advantage of expanded memory and an 8087 or 80287 co-processor. If you have enough expanded memory you can place the entire worksheet there. The combination of an 80287 and the Assembly language in which it is written, makes it *fast*.

Installing Silk is simplicity itself — copy the 5 disks and answer 4 questions about the types of display and printer you will use for text and graphics. The down side of this is that you may not be able to do any fancy printing. To load Silk you can either go through an Access system or straight into the spreadsheet. The Access menu has a novel touch — keyboard logging.

Keyboard Logging

With keyboard logging enabled, every keystroke is recorded in KEYSTROK.LOG. The keystrokes previously stored in the KEYSTROK.LOG file are moved to a

backup file called KEYSTROK.BAK, so records are available of the last and the second last times you used the worksheet. What value is this? If you've ever forgotten to save a file, or if you've ever experienced a power failure in the middle of doing something, you'll know why! As the process is entirely automatic and has negligible effect on Silk's speed, it could well be a valuable feature.

A friend of mine has developed a routine to show off this feature. Try this on any other spreadsheet (better still, don't try it) — He creates a Silk worksheet, en-

ters some figures, and then, with the worksheet still on the screen, turns the system off! He then turns the system back on and invokes Recovery — it's fascinating to watch the screen filling up with the figures entered before power was 'interrupted.'

After Silk is loaded, it displays the familiar blue top and side bars with letters for columns, and numbers for rows. Time and date (American format) appear in the top left corner. Press the slash key (/) and a 2 line menu in yellow appears at the bottom of the screen. The second last line displays the menu choices, with one

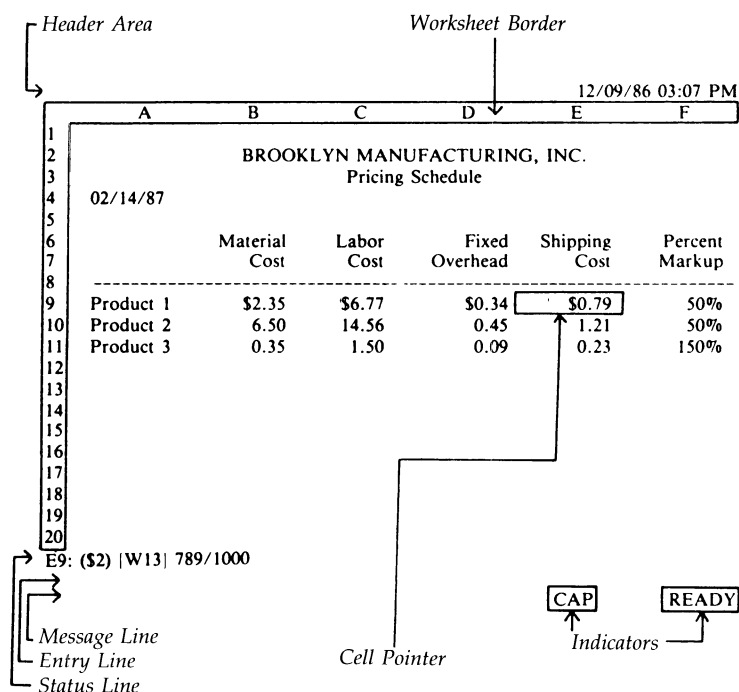


Figure 1. Silk requires 512K of RAM which 640K almost mandatory and even then the size of your spreadsheet is limited by memory; the maximum spreadsheet size is 256 columns by 2048 rows (524,288 cells).

choice highlighted. The bottom row shows the choices available if you press the highlighted key. The horizontal menu wraps round, as all such menus should. Selection is by using the Space and Backspace keys, or by simply pressing the first letter of each command. As you move down from one menu level to another, the choices already made appear on the third bottom line, so you can see exactly where you are and what you have done. Also the designers of Silk have elected to put a lot of choices on each line, producing a broad range which is probably easier to use than a narrower range that requires you to drop down a number of levels.

The use of the Space and Backspace keys in the menus takes a bit of getting used to, but has apparently been done to allow moving around the worksheet with the normal cursor movement keys even while a menu is displayed. To retrace your steps in the menu system the convention of using Esc is followed, although to return you directly through all the steps, F7 is used.

Help

Most of the main menu choices are self-explanatory, so we'll skip those and go straight into Appendix, another remarkable feature of the package. Appendix introduces us to Silk's on-line Help facility. When you call up Help, the screen is divided vertically down the centre and the Help fills the right half, with the spreadsheet remaining in the left. Not only can you see the spreadsheet, you can continue working on it. Appendix starts by explaining how Help works. As this information is too lengthy to fit on one screen, you can scroll up or down one line or one screen at a time, as well as going straight to the beginning or the end of the Help message. You could describe this as being non-context-sensitive help; in other words it's always the same no matter where you are in the spreadsheet commands.

Once you're in the Appendix, you can also select items from a short menu: Functions, Key-Definition (function keys), Row-Codes (indicating that a particular row is part of a Time Series Model), Indicators and Macros.

The other part of Silk's Help facility is the context-sensitive part. Press F1 on a blank worksheet and you get Help on the Ready mode. The Slash Key brings up the menu and the Help changes to give you Help on the menu choices; this happens no matter where you are in the menu structure. The combination of context-sensitive and non-context-sensitive help

should mean that you don't need to read a manual and this is in fact what has happened; the manual doesn't cover each of the functions, commands and macros in detail because you can use the Help system instead. The only features the manual does cover in detail are those claimed to be unique: Keystroke Logging, On-Line Help, Time Series Model, Allocation and Form Processing.

As well as explaining these functions, the manual is intended to provide a conceptual introduction to the spreadsheet. First-time users are advised to read the conceptual introduction and go through the tutorial lessons.

We've had a look at the first two of these 'unique' features; now let's have a look at the others.

Time Series Model

Even if you don't recognize the phrase you are almost certainly familiar with the concept. A series of columns (months) and a total (year) is the format of the most commonly-used spreadsheet. Silk's feature is designed to take away some of the drudgery of constructing such spreadsheets. You specify Base time periods and Summary time periods and the program puts identifying headings at the top of each column. You fill in a Data Field Schema Definition FORM to record the specifications of each Data Field. The names of the data fields appear down the first column.

When you highlight a cell, the status line shows the Time Period Name, the Data Field Name, the cell format and any applicable formula. In an ordinary data field the formula may refer to other data fields (SALES-COST OF GOODS) and in a Summary Period column the formula will use the time period names — SUM (PROFIT(Jul/87,Aug/87,Sep/87)). Notice the use of Names instead of cell addresses; this should make the spreadsheet easier to understand. There are other advantages too: formulas are stored in the FORM, reducing memory required to store them; if you add a data field or a time period you don't need to copy formulas to the new cells, you can validate data field entries, either during data entry or when the worksheet has been finished; and you can use the LAG function to use a formula that refers to a value stored in a different time period.

Allocation

Data Allocation refers to the situation where an amount should be allocated in differing proportions to a number of

categories. Perhaps an example will make this clear — We have received 200 (dollars, lemons, software packages — it doesn't matter what), and we want to allocate them to A, B, C, D and E in the proportions shown —

A	1	11
B	3	32
C	5	53
D	3	32
E	7	72
Totals	19	200

We also want the amounts to be calculated so that the numbers produced are whole numbers and that they add up to 200; the last 2 requirements are typical, even though they contradict each other.

In Silk, you access Data Allocation by selecting /Data Allocate. The first parameter required is Multiple, which determines the accuracy with which the quantities are calculated. In our example we want whole numbers, so Multiple is 1. If we were dealing with sums of money and wanted the calculations made to the nearest cent, the Multiple would be .01. Depending on the value of the Multiple, the numbers in the range may not add up exactly to the total; when this happens, the last value in the data range is adjusted up or down to make the range add up correctly. Silk allocates the 200 thus —

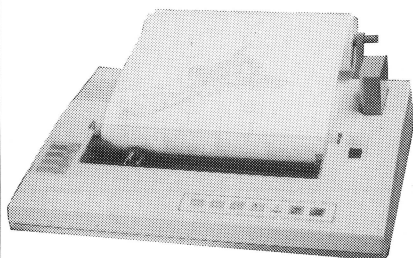
A	1
B	3
C	5
D	3
E	7
Total	19

Data Allocation could be invaluable when doing financial projections: income projections, sales projections and so on.

Form Processing

Forms Processing allows you to make and save the specifications of certain commands. These are PRINT, GRAPH, Goal Seeking criteria, Data Sort and Data Regression. You can store as many as 240 forms for each category. Rather obviously, the Worksheet Default Settings Form can have only one lot of settings, so you can set up a different form if you expect to be using different settings frequently. For example, you can save two different PRINT forms with different margins and page lengths, and you can choose which one you want to use without having to change the specifications each time.

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 : 210.0mm×300.0mm (A4 size)
 Roll Paper - 214mm width
 : 50mm core dia. (max.)
 Max. plotting speed : 92mm/sec.
 Step size : 0.2mm
 Pen types : Ballpoint type (water soluble)
 : OHP type (oil soluble)
 No. of pens : 4 (black, red, green, blue)
 Panel Control : Up, Down, Left, Right, Pen Select, On line
 Indicators : Power, On Line
 Interface : Centronics parallel interface
 Options : Emulates Roland DXY800 for AutoCAD, Amdek Amplot II for Lotus and Symphony.
 Water pens, Oil pens, Paper roll, Print rom, Font rom — Pack centronics cable.



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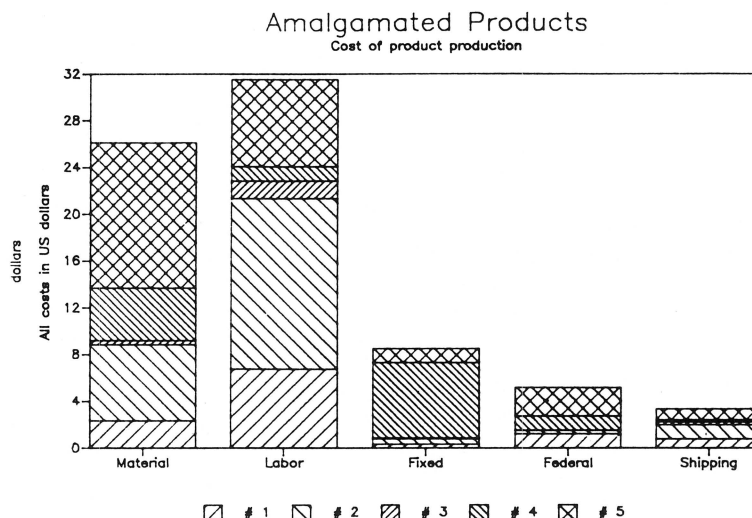


Figure 2. Silk can produce 9 types of graphs: line, bar chart, horizontal bar chart, stacked bar chart (shown), mixed graph, pie chart, exploded pie chart, XY graph, and hi-low-close-open graph.

Graphs

To prepare a graph, you first select /Services Graph, which brings up a Form for you to fill in (you can save up to 240 graph forms). This form has no less than 33 fields to fill in, but after you've done the first one you'll probably find that you won't want to vary most of the fields too often. Amongst the usual choices are less common ones such as 2 footnotes and 2 sideways titles, both in whatever colours you care to choose.

Silk claim it produces 9 types of graph, but you might lump some together: pie chart and exploded pie chart, for example. Anyway the 9 claimed are: line graph, bar chart, horizontal bar chart, stacked bar chart, mixed graph, pie chart, exploded pie chart, XY graph and hi-low-close-open graph.

The 'mixed graph' is a bar chart plus a line graph marking the sum of each of the data range values that correspond to a given X-range value.

Function keys

Silk uses 21 function keys, each of the 10 keys both unshifted and Control shifted, plus one Alt shifted. The unshifted function keys have definitions that are reminiscent of Lotus 1-2-3, although they are not all the same.

If you are familiar with 1-2-3, you will be reminded time and time again of those things in Silk that are similar to, but not identical with, 1-2-3. An example is the writing of macros. Although they are quite similar in style and vocabulary, you will

not be able to get a 1-2-3 macro to run in Silk without some minor modifications. The appendices to the manual devote 2 pages to the transfer of files from 1-2-3 to Silk and Silk to 1-2-3 and a further 3 pages listing the differences between the 2 programs.

Circular References

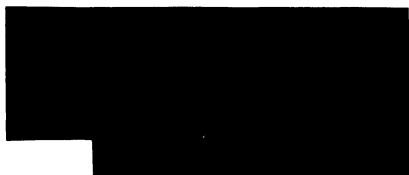
1-2-3 doesn't help much when you inadvertently create a circular reference but Silk provides 'Advanced Circular Cell-Reference Detection.' This allows you to step through the cells referenced by the formula until you find the incorrect one.

Not being able to foresee the future, I don't know what sort of success Silk will have. It deserves to succeed because it is a good spreadsheet that is refreshing in style and in many ways offers more than Lotus; for starters it is not copy protected and sells for about one-third of 1-2-3's price. It is loaded with features; I have only touched on the highlights. I fear that 1-2-3 is too firmly entrenched and is likely to remain so until new programs designed for OS/2 start appearing. But if you want a real bargain, take a look at Silk. □

Product Details

Product: Silk
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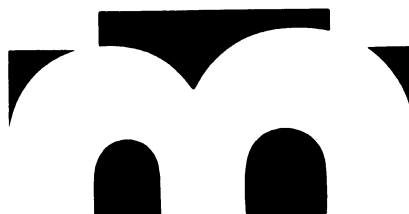


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Computers go for a dive

Small businesses are going under all the time, but Tracy Simpson found two that were successfully taking a dive.

AUSTRALIA HAS A 3000 mile long coastline envied by divers throughout the world, endowed with plenty of sunlight and boasting an unrivalled assortment of marine wildlife and scenery. It's not surprising, then, that 'dive shops' have sprung up all over the country.

Safety regulations are of the utmost importance for those diving establishments which not only sell equipment but also running training schemes — it's essential that details of equipment sold and the status of trained individuals is well documented.

Like many small businesses revolving around an area far removed from the computer industry, PC technology had not been a primary concern of those involved. However, computer technology is has become difficult for even divers to ignore, and PCs are being installed in most diving shops in Australia.

Deep 6

Deepest 6 Diving, with four locations in Sydney, recently decided to take the plunge and invest in an IBM XT, acting on the advice of one of its computer minded instructors, David Ogilvy. 'As much as we loathed the idea of the initial stages of set up, it did seem to make sense, and I'm very happy with the results,' said Paul Rossman, the owner.

Deep 6 uses the XT to keep extensive records of each diver passing through its courses: name, address, age, sex, diving courses obtained, diving courses inter-



ested in, medical certificates, and diving holidays taken. The company is very much geared around the individual diver, and safety is of prime importance — they still back up on hard copy for legal purposes.

Using this customer information base, the staff are able to find out which individuals are interested in which courses and plan training schemes around those interests. For example, should a number of individuals be interested in Deep Diving, the instructors will gear their schedules around that demand.

'We have found that this use of the IBM has been the most successful,' said Ogilvy, who is also the programmer of the system. 'Not only do we satisfy our customers, but we are also able to successfully fill the courses.'

Deep 6 has gained a reputation for its expertise in, and dedication to, continuing education for divers, so it's particularly

important that this system is effective and efficient. Deep 6 now also offers its divers a referencing service — should an individual be interested in diving in Fiji, for instance, Deep 6 accesses its database and sources every publication that has written about Fiji going back to the early 1960s.

Ogilvy uses dBase III to program the shop's major needs. Linking this to WordStar, he is able to generate letters,

Figure 1. Deep 6 (above) uses its IBM XT to keep extensive records of each diver passing through its courses: name, address, age, sex, diving courses obtained, diving courses interested in, medical certificates, and diving holidays taken.

Figure 2. David Easson's Frog Drive (right) has gained a competitive edge by servicing clients and inventorying stock using an IBM compatible and dBase III.

documents, labels and the Deep 6 special Club magazine. Price lists are generated using Lotus 1-2-3. Ogilvy has also used his expertise to develop a program in Basic, for air consumption calculations — very important on deeper dives. He is a member of a PC user group and has found that by downloading some of the public domain graphics packages, such as PC Draw, through a modem link, he has been able to design overhead transparencies for additional teaching aids.

Enthused by the results so far, the team at Deep 6 is creating a representation of the human body to demonstrate the effects of breathing gases under pressure at varying depths on body tissue. This is related to decompression sickness or 'the bends' — something that must be understood for safe diving.

Using a compatible portable, Ogilvy has also entered lecture notes into the system giving the instructors the facility to change these notes and update them as required.

Education is a high priority and Sea Cards, allowing the diver to purchase air bottle fills, go on organised dives and hire equipment, are often the only way of establishing a diver's experience. Should this card be lost or stolen, it is now possible to trace that diver's experience quickly through the computer. A diver's education need not stop at learning the basic steps. Courses such

as Advanced Diver, Rescue Diver and Dive Master are all aimed to increase experience and expertise in the sport. PADI (Professional Association of Diving Instructors) is one of the more widely known diving institutions in the world and has installed four PCs in its Australian head office. Once a diving school such as Deep 6, has certified an individual in a course, the forms are sent to PADI. The information is processed and stored in the system and individual Sea Cards are issued.

One can accumulate several Sea Cards depending on the qualifications required. In Sydney for instance, there are many wrecks to explore, but few of these are above 135 feet. Few conscientious diving schools will allow you to dive these wrecks without a specialty qualification such as Deep Diver, Wreck Diver or both.

In order to obtain this certification, the diver must attend and succeed in passing the Specialist course. On completion of the course, to make the process of obtaining the Sea Card much quicker, PADI is hoping to be able to link up with the various dive schools via modem and process the information directly.



Unusually for a business, Deep 6 does not consider stock taking to be a high priority. 'It's all on display and we can make a visual valuation', said Ogilvy.

Frog Dive

Unlike Deep 6, Frog Dive, also with four establishments, considers stock taking as one of the major uses of its IBM compatible PC.

Peter Easson, owner of Frog Dive, has been dabbling in computer technology for some years. He imported all the components for his PC from Taiwan and assembled them himself. Unlike many 'off the shelf' systems, Easson's PC has never let him down.

He is also using the system to control student information, and, by utilising dBase III he has been able to devise a program to cope with quoting, invoicing, inventory control, stock re-ordering, slow stock information, price lists and various reports.

Easson started with a Hewlett Packard 150, but found the software too restricting so he made the move into the IBM environment. He taught himself dBase III and set to work to build the ultimate Dive

Shop program. Frog Dive carries more dive stock than many other stores and he has found it necessary to keep a close watch on supplies.

Each item of equipment brought in is stamped with a computer generated label showing the product name and code, the invoice number — to help with guarantee queries — the price, the date of purchase, the quantity, and finally, a special code which the customer cannot decipher, that lets Easson know by how much that particular product can be reduced.

Unlike many retail outlets, dive shops are priced competitively, as customer allegiance is vital for future sales. Consequently, diving school magazines and personalised letters have become an important part of a 'we're your friend' process.

Both Deep 6 and Frog Dive produce monthly in-house publications offering discounts, trips away, editorial on activities, leisure dive timetables, course details and so on.

Niceties like Bar-B-Qs, port evenings, ski weekends, sky diving and other functions are also organised by the shops. If they are to be successful in retaining the allegiance developed through these activi-

ties, the friendly service must be exhaustingly maintained — this is where computer generated letters and notices maintain the competitive edge.

Chips on Your Wrist

Further technological infiltration of the industry has appeared in a more directly life saving form with the development of computerised gauges.

The gauges come in various forms. In one example, there is a depth monitor which uses three microprocessors, cross referencing each other to indicate time and depth.

Another application of this micro technology is the utilisation of the microprocessor's computational powers to gauge the amount of gases in a diver's body tissue at certain depths, indicating whether there is a danger of getting the bends. This is a vital part of diving and so far the equipment has taken over the mechanical methods of gauging diving situations without any problems.

Under the ocean might seem an unusual place to find computer technology, but microcomputers have found a functional home in diving circles. □

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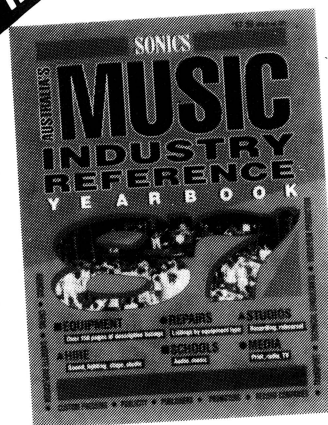
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The 1987 FRAMEWORK II “doing more for you” Contest

The Framework Story

FRAMEWORK II (or just Framework to its friends) is a software package — some would say the equivalent of five or more normal packages. It belongs to the group called Integrated software, alongside Symphony, Ability, Enable, Open Access, Microsoft Works and others. Where it differs is in the degree of uniformity and compatibility within all modules. In fact, the term ‘module’ is more correctly applied to other packages which do have modules with a degree of connectivity and transferability. All of Framework’s skills are available at the same time and share a common system of menus and a common programming language FRED.

The parts of Framework include Word Processing, Spreadsheet, List Manager (Database), Graphing, Outlining, Telecommunications, Macros and a very powerful programming environment.

The name goes halfway to explaining the structure of the product — an interconnected structure of ‘frames’ (named containers of text, data, graphics and customized applications). The user is given an analogy of a desktop which has filing cabinets (the disk drives), folders (files) in trays and frames (where you do the work). The top of the page has a pull down menu system and the bottom line contains a host of status information.

Some users find one of Framework’s abilities sufficient incentive to start using it and others purchase because of the promise of multiple strengths with a fraction of the learning time of equivalent, separate packages.

Regardless of the reason for using Framework, every user (and especially our contestants) says the same thing: ‘I’m only scratching the surface of the power of this product — I wonder if I’ll ever discover everything it can do!’

PS: Don’t forget that you can pick up a free demo pack of Framework II at your local PC dealer! □



IT'S ONE THING to see a coupon next to the 'StupendoChoc' dispenser at the corner store for a 'Win a trip to Dubbo' competition. All you usually have to do is say why you like getting crumbs of chocolate in your beard or why you only ever feed the stuff to the kids. It's another thing entirely to enter a competition like this, where skill and creativity are what matter.

Perhaps it's because Framework is such a wide ranging package that even Ashton Tate, the product's distributor and sponsor of this competition, allowed three extremely wide categories. They weren't disappointed either, because a wider range of entries couldn't have been imagined. Any

delusions that Framework was purely a corporate use package were soon dispelled. Entries ranged from hard core business use, through software and presentation development tools to educational, home and hobby use.

Category A asked for the Most Interesting Use of Framework and required a disk and printout of the application. This category attracted entries from all types of users, but was especially good for beginning users who had discovered the power of the package but had not yet had time to (or had no need to) learn the FRED programming language. It's often said of Framework that new users immediately think of applications they'd never

dreamed of using a PC for. Framework's that sort of package — the tight integration of the various parts and the logical 'desktop analogy' immediately lend themselves to hundreds of applications.

Category B, Most Innovative FRED Application was more for the advanced user who had taken the plunge and started programming in FRED. The famous 'wall' in dBase comes when users can no longer do everything they want from menus or the command line and must learn to program in the dBase language — if anything, FRED is even more daunting to look at. Despite that, once a user has taken the step and 'climbed the wall' the FRED language opens up a whole new world of PC applications. This is borne out in the range of applications submitted in this category.

Category C was designed for people who have never used Framework or have only had a basic exposure to it. The What I'd Do With Framework If I Had The Chance category might have just attracted entries suggesting spreadsheets or lists of names or accounting systems and the like, but the imagination and innovation

shown in the first two categories was just as evident here. Framework has an indefinable quality which allows — almost directs — people to look at problems in all sorts of new ways.

Just to show you the range of applications shown in the entries, here is a sample — a number of entries utilized Framework's ability to link multiple spreadsheets into a solution. Up to 32,000 spreadsheets can be open on the Framework desktop simultaneously. As if this weren't sufficient, macros can be used to put some away and open others as needed. In practice, many large spreadsheets built under Lotus 1-2-3 (say 300 kilobytes), can be loaded into Framework and then split into a number of smaller, more manageable units. Quite a few entries demonstrated this, using small spreadsheets for holding constants, making calculations, producing reports, exporting to other systems and so on. Spreadsheet applications included manufacturing systems, job costing systems, company reporting systems and so on.

Many other entries were based on Framework's power with text. Rather than

simply allow text processing within a spreadsheet cell, Framework has well featured word processing abilities which can be used in word frames, outlines and, of course, spreadsheets, databases and telecommunications. Using the standard menu functions, the 30 or so text related FRED functions and FRED programming, entries ranged from applications which searched for text and copied the occurrences in context, to applications of use to linguists and anthropologists.

Yet other applications took advantage of Framework's organizational capacity. Since any combination of frames can be contained and organised within other frames, different types of information can be logically grouped for easy maintenance, recall and storage. Text can be grouped with statistics, numbers with associated graphs, databases with reports, and so on. This is what one entrant, Mike Ray said about his application: 'The Summer Institute of Linguistics is involved in working with Aboriginal and Torres Strait Island languages and I was responsible for making some estimates of language viability. I used Framework II to summarize a quantity of available information, including the use of traditional languages and estimated comprehension of English.'

Mike's application uses word processing, database for data logging and report generation, spreadsheet for data manipulation and graphing for uncomplicated reporting of the spreadsheet results.

Some entries involved time saving applications which automate repetitive tasks involving text or data. These included invoice generation (answer the questions and Framework allocates an invoice number, records the information, verifies it and spits out a printed invoice from a dedicated printer), job quoting systems (like the invoices system but FW spits out a price estimate instead!) and many others.

Here is a sample of some of the other entries: a system for weavers, which calculates and displays a Drawdown which is a picture of the unique pattern resulting from a combination of threading draft, tie-up and treadling (!); a database system used to prepare a complicated public affairs report — professionally printed and presented; a systems engineering model of a dam system, using simulated studies of the dam's performance for many years using randomly generated conditions of stream flow, flooding, water use and so on; a very professional programmers toolkit, producing customised skeleton code in Pascal; a number of education related

FRED?

FRED is the name of the programming language which forms the backbone of Framework. It supposedly stands for FRAMES Editor but creator, Robert Carr, swears that it was the name he originally wanted for the whole program — it was what he called his scratch disk. Whatever the derivation, FRED has caused more consternation to Framework users than any other programming language has caused before.

To quote from the 'Introduction to Programming' book from Ashton-Tate — 'To create a FRED program you must decide exactly what you want to do... Writing programs is a form of delayed gratification, but it's worth the wait many times over. It's as if you had a craving for chocolate cake one day but decided that, rather than bake the cake on the spot, you'd write the perfect chocolate cake recipe so that someone else could bake it. You'd experiment and fiddle around with the ingredients and baking methods until the recipe was exactly the way you liked it.

You could then hire a chef to bake the cake whenever you liked, exactly the way the recipe describes it (while you are off playing water polo or drinking mai tais).

All you would have to do is order the cake and then eat it — whenever and as often as you like. You write the recipes (programs). The ingredients are the various elements of the FRED language (the building blocks, syntax and recalculation), your recipe arranges the ingredients in the order that will accomplish a task and FRED is the chef who executes the recipe'.

Enough talking about FRED, let's see what it does. Users of spreadsheet programs will already be familiar with a subset of FRED — the functions such as @SUM and @AVG. Other FRED commands are quite unique. @MEMAVAIL returns the amount of RAM still available and the most powerful of them all, @PERFORMKEYS, acts just as though the following commands had been entered from the keyboard. Here is a simple FRED routine which uses a number of fairly obvious functions -

```
!Weekday Calculator.
!If no parameters are passed, returns today as a string.
!Otherwise takes a date value and returns its day as a string.
@local (checkdate,dif),
checkdate := @if (@itemcount(>0), @item1, @today),
dif := @mod(@difftime(checkdate, @date(1984,1,1)), 7),
@if (dif<0, dif := dif+7),
@select (dif+1,"Sun","Mon","Tues","Wednes","Thurs","Fri","Satur")&"day"
```

applications including course management systems, student performance logging and reporting systems and so on. Some entries came from educational institutions where Framework is used as a teaching aid for courses such as accounting and economics.

Two entrants came up with very similar (and very good) systems for incorporating the IBM graphics character sets into Framework frames (for producing the likes of boxes, diagrams, enhanced computer based training screens). These showed the ease with which Framework users can produce self-supporting menu systems, either on the bottom lines of the screen or in the main screen area. Some entries controlled hardware, such as automatically loading fonts onto printers as needed by printing sessions or even using Framework's tone generating @BEEP function to make a PC Piano. One application used advanced menu techniques to allow customised mouse control of applications.

The Most Interesting Use of Framework

Winner: Jim Milson of Killara NSW for his entry A Weavers Drawdown. In Jim's own words: *After accepting early retirement, I took up weaving as a hobby in 1986. In the middle of that year I acquired an Olivetti M24 PC and Framework II. I am now in the second year of the hand weaving course at a TAFE college.*

A successful weaver needs to keep an extensive set of records on paper, as well as his weaving samples, detailing as much as possible of his selected yarns, prices and calculations, together with notes about how he went about each stage of the project, the difficulties encountered and the solutions found to the various problems.

I soon found that Framework II was extremely useful for keeping these records. A containing frame was used to hold several linked spreadsheets, accompanied by text frames. The finished document became the written submission accompanying each project required by the college. I also found that the more time I spent in committing phases of the design of a project to spreadsheets, the less mistakes I made in executing the project.

I am collecting the various uses to which spreadsheets, databases, word frames and FRED programs have been put and I intend to call this collection 'A Weavers Framework'.

My submission to this contest is a part of this collection. It is a program to produce a Drawdown. The Drawdown is a picture of the structure that would result from a particular combination of threading draft (how the warp is threaded through the loom), tie up (how the treadles are tied to the



shafts) and the treadling (the order in which the treadles are pressed). The 'X' shows where the warp (lengthways) threads show on the face of the cloth. The spaces show where the weft (crosswise) threads show on the face of the cloth.

If the weave is to be 'Colour and Weave' the weaver will require a further diagram . . . which represents the two colours with 'X' and 'O'. The eye of the viewer is drawn to the resulting colour pattern and does not notice whether the colour comes particularly from the warp or the weft.

The judges were impressed by this entry for a number of reasons. It was by no means the most complex entry, but it was an elegant solution to a user's need. The application neatly combined FRED code with entry routines and spreadsheets for displaying the patterns. Thought was given to presentation, which was most professional. Error handling was also excellent. At all times the user was kept informed about what was happening and never left to wonder if the PC 'had hung.'

An important consideration was that the application is ongoing. Jim plans to produce a much more involved package progressively. The submission showed great promise for this endeavour.

Jim Milson of Killara NSW is shown receiving his cheque for The Most Interesting Use of Framework, from Keith van Klink, managing director of Ashton-Tate. Three screens from Jim's entry, Drawdown, are also shown.

Most Innovative FRED Application

Winner: Reggie Howard of Papua New Guinea for his entry Xamin. Reggie writes: *This program is nothing elaborate but I think it shows some of the beauty of FRED. . . . To write a similar program in Basic or Pascal would be a real pain, while in FRED it was a snap. I work with linguistics and linguistic research. Not want-*

ing to read through megabytes of data just to find a few particular things, I wrote Xamin. It runs through a document and extracts every paragraph which contains a particular word, phrase and so on. It then bolds the occurrence. The second part is a word frequency list maker.

The judges felt, as with the category 'A' winner, this application was only the tip of a much larger, still developing set of tools. Reggie is discovering the text manipulation powers of Framework which can be combined with spreadsheets, databases, import/export routines and, of course, FRED. Xamin uses well documented, straightforward FRED code to perform a task very efficiently.

The Judges

THE THREE JUDGES represent all aspects of PCs, and in particular, Framework, in Australia.

Les Bell is recognised as Australia's leading PC authority. He has access to every PC software package imaginable but uses Framework as his everyday productivity tool.

Bob Futcher is an expert in Framework, particularly in textual applications. His skill with an appendix has to be seen to be believed, though he has a colleague with particular expertise in colons.

Neil Buckley is senior consultant with Ashton-Tate. He was recently brought over from Ashton-Tate in the UK where he was National Training Manager. He attributes his introduction to Framework to the time his boss said 'Do you know Framework? Well you've got two days to learn.' He uses it as his daily productivity tool, running other packages from within Framework via a menu.

Each judge expressed surprise at the response to the contest and to the very high standard of entries. They did, however, have some advice for anyone entering similar competitions —

Les Bell: Read the contest rules or the question very clearly. Spend as much time as necessary debugging and bullet-proofing the code.

Bob Futcher: Clearly indicate what the application is and does. State who should or could use it. Test your application with a novice user. Make sure there are no references to drives or subdirectories that the judges won't have. Don't expect the judges to correct bad code or make allowances for it.

Neil Buckley: Spend more time on the presentation of the application. Make the application self contained — a complete system demo is best. □



Sally Higgins of Hobart plans to donate her winning entry in the What I'd Do With Framework If I had A Chance category to the Orienteering Federation of Australia.

What I'd Do With Framework II If I Had The Chance

Winner: Sally Higgins of Hobart for her entry A Sporting System in Framework. Sally said in her entry: I intend to develop a 'Sporting System' using Framework and then donate both to the Orienteering Federation of Australia.

Orienteering is a sport which involves finding your way on foot through unfamiliar country using a map and compass. It is becoming increasingly popular in Australia and in 1985 the world titles were held in Victoria. In January 1988 the Pacific Championships will be held in Tasmania.

I am Orienteering's Tasmanian State Statistician and National Ranker. My responsibility is to process results of State and National meetings. I intend to hold this combined-post only long enough to establish and consolidate procedures. My interest is in the development of systems sufficiently user-friendly for those in the know.

I am currently using a combination of Lotus to enter and calculate the results and the Word to prepare them for publishing in the press and newsletters. This achieves the end, but is somewhat clumsy and still requires a lot more work to be done with the macros to make it sufficiently user-

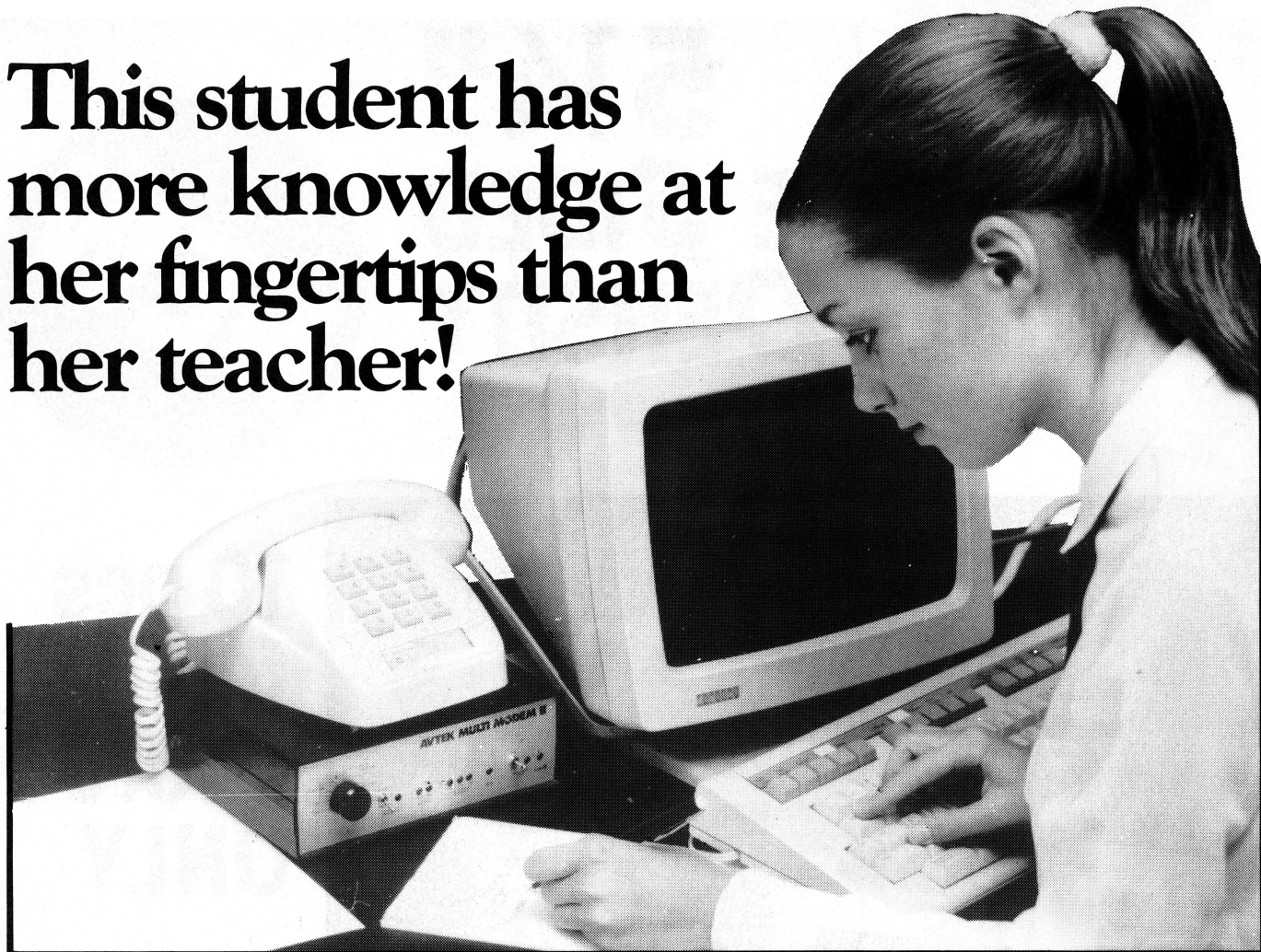
friendly and safe for amateurs to use. Then of course it will be very difficult to modify if the calculation criteria change.

At the moment it takes me about 7 hours to input, calculate, check, and wordprocess the results from an event of about 100 competitors. A lot of this time is wasted in the interfacing between large spreadsheets and the wordprocessor.

This was a pleasant section for the judges because the entrants were full of enthusiasm for a product that they had tried out via the demonstration pack and now had hundreds of applications to try out. All entrants had interesting and practical uses so the decision process (as in the first two categories) was quite an exercise. The judges were impressed with the very broad range of applications within one theme, that Sally intended to put to use with Framework. They were hard pressed to think of a part of Framework that she didn't intend to use.

Congratulations to the winners from the judges, Ashton Tate and everyone else involved in this competition. Graeme Johnston of Ashton Tate intends to submit many of the entries in the US Framework contest, due to their high quality. □

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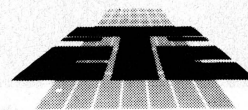
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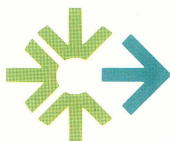
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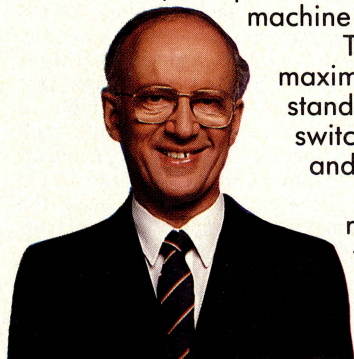
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I'm telling this story about the Novix chip because of a combination of circumstances — firstly, I became very interested in the language Forth and its various features and quirks. This led me to write the two-part article 'Come Forth' (YC May and June '87). Secondly, I offered interested

readers a public domain version of Forth for either the IBM PC (or compatibles) and for the Apple II series. I expected to receive 20 or 30 requests at the most but the requests were almost overwhelming. Every state in Australia was represented (and we even received letters from New Zealand!). Using this as a guide, there must lots of people out there who are interested in Forth. Most of the letters we received also asked for more information and further articles.

Thirdly, I have long been interested in chips that are at the forefront of technology (see 'Enter The Transputer' in the October issue). Finally, I have been fairly heavily involved with Maestro Distribu-

RISC, CISC and WISC

MOST OF THE processors with which we are familiar (68xxx series, 80yyy series and 32zzz series) are all Complex Instruction Set (CISC) type processors. They have a rather complicated set of programming instructions, which must be decoded by the processor and converted to micro code instructions. The micro-coded instructions are built into the microprocessor and it is the efficiency of these instructions (and the manner in which the program instructions are decoded) which determines the overall efficiency of the processor. This in turn determines how effective a processor is when it runs a high level language program such as one written in C, Pascal or Basic.

This type of processor is what I call a Programmer driven chip — it makes the programmer's task easy (relatively) but makes the micro work harder to compensate. On the other hand, we have the Reduced Instruction Set (RISC) computer, which has a very limited instruction set to be decoded into micro-code. This

makes the programmer's task harder, but means that the processor becomes far more efficient. The programmer now has to ensure that his or her code is efficient enough not to cause any additional overheads for the assembler or compiler, as this will negate the advantage of the Reduced Instruction Set.

In a recent edition of *Byte* (April '87, pages 187-194), Phil Koopman proposed a Writeable Instruction Set Computer (WISC) type computer. His idea was to build a processor with a Writeable Instruction Set so that the micro-code section of the processor could be written for specific purposes, similar to having a programmable read-only memory as the micro-code store.

Let's take this one step further and remove the micro-code completely from the chip and write our external Assembly language type instructions so that they can be directly executed by the processor. Impossible in one of the CISC type computers, difficult in RISC type but easy in the Novix NC series. Forth becomes the micro-code for the NC4016

and this is written externally by the programmer. This means, in fact, that a programmer working on the NC4000 series in Forth, is writing 'external micro-code'.

Another popular technique used to improve the throughput of classical architecture chips is that of pipelining. With this technique (the 6502 is a typical example of a pipelined chip), instruction N+1 is being fetched from memory whilst instruction N is being executed. When instruction N is completed, N+1 is passed to the execution unit and instruction N+2 is fetched and so on. This is fine for linear code, but the moment that a branch takes place (for example: a jump, branch or subroutine call), then the advantage of the pipelining is negated. A pipelined chip architecture would be self-defeating in Forth because the whole language is simply a series of calls and exits from subroutines.

I shall attempt to cover the topic of RISC, CISC and WISC computers in a future article, so I'll leave it here for the time being. □

tors, who designed the Maestro (GPA) SuperModem. I introduced the principles of Maestro, Chris and Dan, to Forth about five years ago. At that time they were service technicians for Lowrey Organs and they came to do some service on my organ, and saw my old SYM-1 6502 based evaluation board on which I was teaching myself Forth. Chris and Dan became very interested, to the extent that Chris (who does all of the software development) went out and bought an Apple II and started learning Forth, used it to develop an inmodem for the Apple II (which has just been updated and released as a kit project through a companion magazine) and then used it to write the software for the GPA SuperModem.

Where does all this lead to? Well, Charles Moore, the man who 'invented' Forth has built a dedicated Forth chip (in fact there are 3 different versions of the chip) and has released it to the general public. The chip is marketed in the USA by Novix and is supported in Australia as well by Energy Control in Sumner Park, Queensland. Chris and Dan have designed a *supercomputer* based on this chip; the computer will be available as a *very* easily built kit and will have a total upgrade path for optional add-ons such as floppy drives, hard disks and so on. The stock version of the kit will run

... the processor will outrun the current batch of IBM XT computers (using Forth) by a factor of about 100 to 1 in the stock version ...

at 4 mips (guaranteed!) and it will be possible to upgrade to 8 mips and probably even 12.

For those to whom these figures are fairly meaningless — the processor will outrun the current batch of IBM XT computers (using Forth) by a factor of about 100 to 1 in the stock version, and by about 1000 to 1 in the enhanced versions. How this chip accomplishes these astonishing figures is the subject of this article.

Before any of you get the wrong impression — this computer is not going to be a neat little packaged IBM or

Apple type of computer. It is designed to bring the power of the latest chip technology within the reach of the average computer user. The board is built to plug in to an IBM slot but can also be used externally with *any* computer that has a serial link and will operate at any baud rate that the host can provide. The same board can also be used in a standalone form, with the addition of several extra components. The IBM model will communicate with its IBM host at the full speed of the host, regardless of comms port speed limitations.

This means that there is no other interpretation required, either in silicon or in software, to degrade the performance of the chip.

However, no matter how fast the IBM (even a 20 MHz 80386 version), it will still be the sluggard of the pair. When Dan and Chris were originally working on the design of the SuperModem, they chose to use a Motorola 6809 8/16-bit microprocessor. The reason for their choice was fairly simple — the 6809 is a chip that is particularly well suited to Forth programming. The NC4016 takes this philosophy several stages further.

The Novix NC4016

Those readers who read my article on the Transputer, will be aware of what an RISC computer is (there are more details in the accompanying boxed item 'RISC, CISC and WISC'). Charles Moore has now built a processor that runs Forth as its native language. This means that there is no other interpretation required, either in silicon or in software, to degrade the performance of the chip.

The processor was designed, built, tested and sold around the Forth language. This makes the chip a pseudo-RISC type of computer because Forth, or rather, its kernel of 'primitives' only take up about 40 instructions. The processor has been optimised to run Forth 'words' as quickly as possible. Below, I'll present some comparisons of just what a difference this makes to the speed at which the chip operates.

The Novix Architecture

The most difficult task confronting me is how to describe the sheer raw power of this chip. I can't think of any sufficiently illuminating superlatives to describe it. The only other chips that can come anywhere near it for performance are the Transputer (still too dear) and the new Acorn ARM chip, which is also a RISC chip and is contained in the new Archimedes PC from Acorn. The Archimedes is a blinder of a computer too, outrunning an 80386 system by about 3 to 1.

As I mentioned earlier, the chip is built around the Forth language. However, compilers are available which will compile both C (the Small C version — integers only) and Pascal source programs to Forth. Oh, the ignominy of it all — imagine compiling C to Forth. Les Bell had to be treated for severe distress when told about this. Source code (in Forth, of course) for a Modula-2 compiler is also available. In order to maximize the throughput of code, the Novix has been built around the typical Forth architecture, which involves the use of RPN (Hewlett-Packard calculator) type stacks. Figure 1 shows a block diagram of this architecture.

As a basis of comparison, Table 1 shows some common benchmarks and their performance on the NC4016.

Comparison

As a further enticement to those readers still not convinced of the possibilities of this chip, consider the fact that Charles Moore and his hardware designer spent several months finding ways to shave just *one more nanosecond* from the performance specifications of the chip (for this reason, it is necessary to use some very high speed decoding chips on any board built around the Novix in order not to introduce external hardware delays, which would negate all their efforts in obtaining maximum efficiency). It had to be optimised to perform subroutine calls as efficiently as possible. The 2 collaborators achieved the (almost) impossible — they found a way of getting the chip to enter and exit a subroutine in a total of one clock cycle. Compare this to the figures for some of the popular processors on the market —

6502	12 clock cycles
Z80	27 clock cycles
6800	14 clock cycles
68000	32 clock cycles
80186	31 clock cycles
	(inside the same segment)
	45 clock cycles
	(to a different segment)

Note also that these are optimum figures for each of the above processors. They do not include the number of cycles required to save any registers that may be

required (for example, the Z80 takes an additional 21 cycles to save each register pair). With the NC4016 (and indeed with Forth itself), there is no need to save registers — the stack implicitly operates on data without the need to push and pop important registers.

The incorporation of the two different stack areas (data stack and return stack) on board the chip helps to contribute to its high throughput capabilities. In addition, the top two items of the data stack are also held on the chip, once again to improve the throughput. The NC4016 has been designed to maximise throughput by separating the chip's functions into four separate buses for data and address transfers.

Due to of the design of the Novix, there is really no such thing as an operational accumulator. T is perhaps as close as we can get to an actual accumulator, as any arithmetic calculation is usually left as the top item on the stack. For high speed data access, the T value is held in an 'on-chip' register and is moved around the system on the T bus (called the parameter stack). Likewise, N (the Next item on the stack) is also located on board the chip itself. The data items are moved from off-chip storage locations onto the NC4016 as additional requests or operations require.

The next bus under consideration is that of the return stack which is used to hold the address of the next word to be executed. Clever programmers also make use of this stack to store the intermediate results of calculations. Caution is required, however, when using this routine, as it becomes fairly easy to lose track of the position of various items and not clean them all off the return stack, with correspondingly disastrous results.

Although it would be very rash to claim that the NC4000 is a parallel processor, the presence of these buses and their associated on-board caches, allows for a fair degree of parallelism to occur, particularly when external memory fetches are being performed. This hardware type of parallelism is not the only way in which the NC4016 enables parallel processing.

Encoded within each Forth word (at the binary level), is the possibility of multiple instructions being performed in parallel. The way in which this operates is determined by the setting of various bits within each Forth word (see Figure 2). A typical example of such parallelism encoded in an instruction is the bit which is Set for a Return from a Subroutine — bit 5 (or 6, depending on how you like to count) in Figure 2 shows how this is done. Likewise,

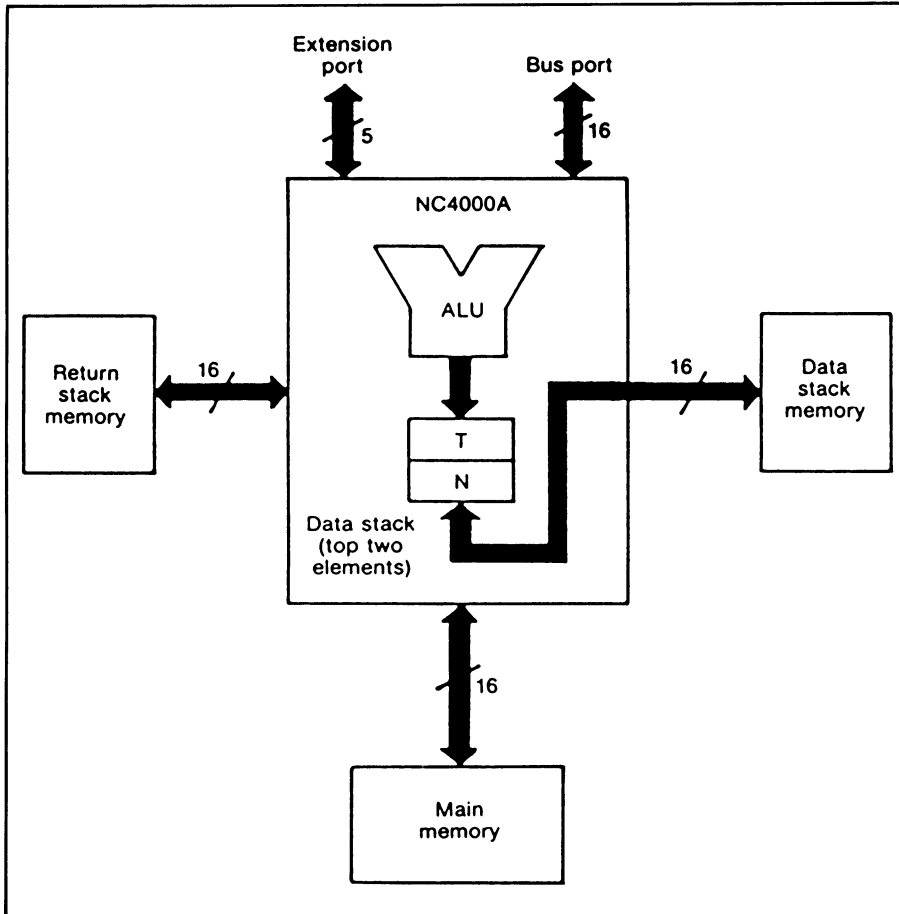


Figure 1. In order to maximize the throughput of code, the Novix has been built around the typical Forth architecture, which involves the use of RPN type stacks. In the block diagram above, note the use of separate buses to handle data stack, return stack and main memory.

Eratosthenes Sieve (x10)	Language	Time Taken
NC4016 (6 MHz)	FORTH	0.45 seconds
VAX 11/780	C	1.4 seconds
NC4016 (6 MHz)	NOVIX Small C	2.8 seconds
68000	Assembler	4.9 seconds
80286 (10 MHz)	C	6.6 seconds
IBM PC/XT	Small C	21.0 seconds
1,000,000 Empty Loops		
NC4016 (6 MHz)	FORTH	0.17 seconds
NC4016 (6 MHz)	NOVIX Small C	4.0 seconds
80286 (10 MHz)	C	5.0 seconds
68000	Assembler	7.0 seconds
68000	polyFORTH	18.0 seconds

Table 1. The only other chips that can come anywhere near the NC4016 in performance are the Transputer and the new Acorn ARM chip which is built around the Forth language. As a basis of comparison this table shows some common benchmarks and their performance on the NC4016.

a word could DUPLICATE its result, without taking any more time than a single cycle (Setting bit 6, or 7). It is even possible (in theory, anyway) to read from *and* write to, an address location, in a single cycle. Still another example of parallel type operation would be in an arithmetic calculation that removes the top stack value. N would automatically be moved into T and at the same time, the third item on the stack (held off-chip) would be moved onto the NC4016 into the N position, thus maximising arithmetic performance on the top two data items.

How It Works . . .

A typical Forth application consists of the programmer using a series of previously defined routines called 'words' to create a new 'word'. This is analogous to using normal English words to build a sentence and then defining a single English word to replace (or stand for) the original sentence. The original routines used are the 'core' of the language and consist of 'calls' to lower level operations which perform the elementary tasks required. These 'calls' also provide a return path at the completion of each low level operation. Thus, Forth itself and the applications written by programmers merely consist of calls to, and returns from, subroutines.

In fact, Forth is referred to as a 'subroutine threaded code' type of language. This means that the language spends most of its time calling subroutines and returning from them and a small amount of time processing instructions inside these subroutine calls. If we can optimise the design of the chip to provide high efficiency calls to, and returns from, subroutines, then we are well on our way to ensuring an efficient processor.

Let's now look at how long some conventional processor chip take to handle subroutine calls and returns. Remember, we will only be talking in terms of the number of clock cycles required, rather than the absolute time because absolute time is more a function of the speed of the crystal and other components.

One important detail should not be neglected here — the Novix does not require a compiler in the normal sense one uses to discuss compilers. One finds instead the Forth colon compiler, which has been designed to optimise Forth code for processing by the chip. This means that a Forth word may be written and compiled as a single entity, allowing an extremely modular and structured approach to programming. Anyone using this chip can write their program directly in Forth. Forth

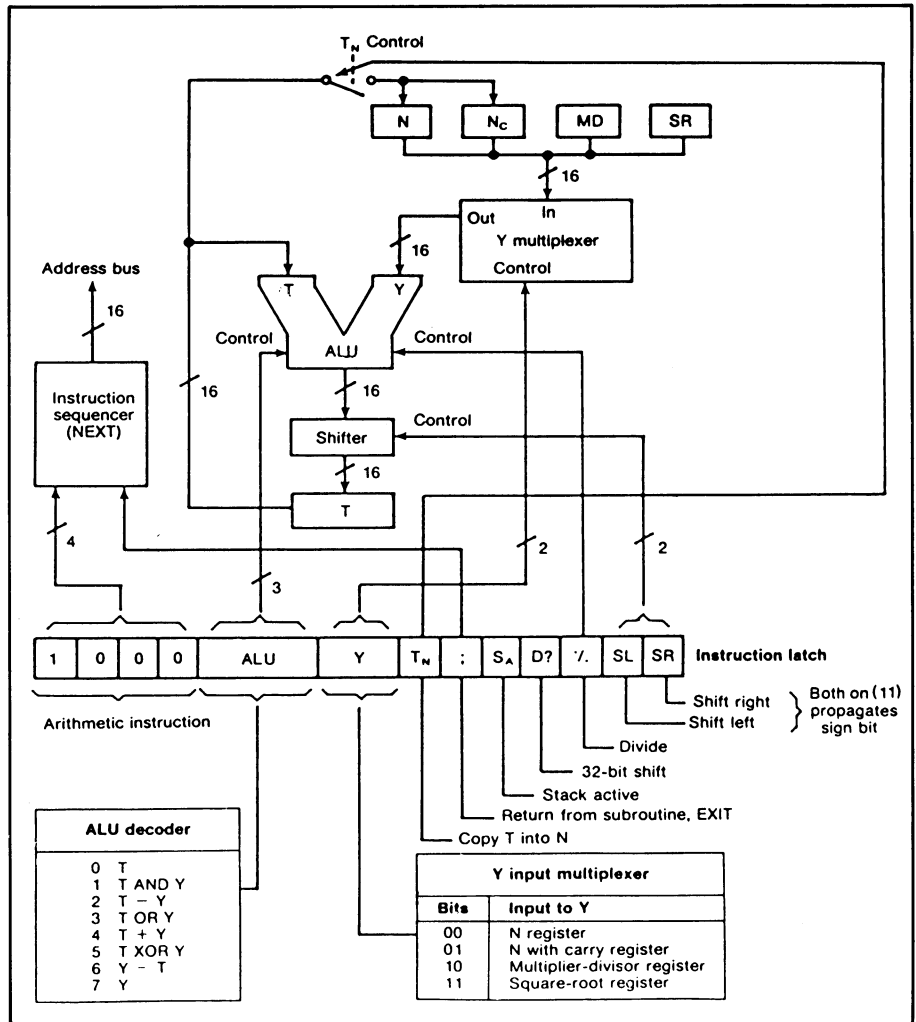


Figure 2. This is a block diagram of the NC4016 internal structure. The first four bit positions define the type of instruction and the last twelve bits control the ALU and registers.

PROCESSOR:	6809	6800	Z80/8085	8088	6502
	LDX 0,Y++	JMP NEXT	JMP NEXT	JMP NEXT	JMP NEXT
	JMP (0,X)	LDX IP	LDAX B	LDOS AX	LDY #1
		INX	INX B	MOV BX,AX	LDY (IP),Y
		INX	MOV L,A	MOV DX,BX	STA W+1
		STX IP	LDAX B	INC DX	DEY
		LDX 0,X	INX B	JMP WORDPTR(BX)	LDY (IP),Y
		STX W	MOV H,A		STA W
		LDX 0,X	MOV E,M		CLC
		JMP 0,X	INX H		LDA IP
			MOV D,M		ADC #2
			XCHG		STA IP
			PCHL		BCC L
					INC IP+1
					L JMP W-1

Table 2. Assembly language statements required to implement the Forth NEXT instruction; note the relative effect of the 6809 processor's instructions compared to the other processors.

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is a high level language (even though one of my colleagues refers to it as a 'write-only' language) and the Forth program is *executed directly* by the processor.

This fact alone means that vast improvements in speed over normal CISC type processors is possible. One side benefit is that one doesn't have to learn Assembly language in order to obtain high speed I/O routines, for example. I have written Assembly language programs for various processors and I know which I'd rather use if I had the choice — a high level language, obviously (even if it is a 'write-only' language). Besides, I rather like the idea of being able to write a Forth 'word' and then test it immediately by placing dummy values on the stack and executing my new 'word' to see if it performs as it should. If *only* other compilers would let me pass a few variables to a newly written procedure, prior to 'including' it into the main program (without having to make it 'standalone', of course).

Figure 3 illustrates the kernel words that make up the NC4016 vocabulary. It lists those words that only require a single clock cycle for execution (except where noted) and also shows Forth words that require one or two cycles. None of these words takes more than two cycles.

A Supercomputer

The supercomputer that Maestro are building for general public consumption is more a labour of love, than a profit making venture. However, there are some interesting commercial possibilities for such a board, including such things as high speed graphics, speech recognition and pattern recognition, high speed servomotor control and so on. Maestro are developing a speech recognition system that will assist hearing impaired people to recognise, pronounce and correct their pronunciation. The computer will be developed in three separate stages, with each development stage dependent upon the demand by users.

Stage I will be the board itself, in any of the configurations mentioned earlier and including a 27xxx serial Eprom programmer (two ZIFs are provided to accommodate the 16-bit architecture) on-board. Both the Eproms are programmed simultaneously, normally with different data, although single programming is just as easy. Such a device would normally cost at least \$1000, without including any computing power.

Maestro are selling the initial kit for just \$699 (the chip alone costs over \$300). Stage I boards will also run between 4

and 6 mips, using off-the-shelf 120 ns SRAMS. A Forth kernel (full documentation supplied) and an optimising compiler (written by Charles Moore himself) are also included in the cost. A block diagram of the Stage I board is shown in Figure 4. Stage I is available now from Maestro Distributors, (043) 68 2277.

For those owners of IBMs who are contemplating the purchase of a board, The Novix will take full advantage of all the off-line storage provided on their machine. For those who don't own an IBM (or compatible) but do have some sort of computer, there is no need for concern — the serial link between the Novix and the host computer will be able to use any floppy disks attached to the host. For those without either of the above, the standalone version provides facility for the programs written by the user to be stored in the upper half (64 kilobytes available) of the Eprom.

Stage 2 will be an upgrade from 5-6 mips to 8-10 MIPS, using fairly fast (here read also expensive) RAMS and a processor upgrade. Anyone considering the need to upgrade from the lower speed processor to the higher, should probably invest in the higher speed processor at the outset. This stage will also include a standalone floppy disk storage capability.

Stage 3 will provide hard disk storage, together with the possibility of replacing the 4016 with a 5016 and then using the 4016 as a slave processor for some mundane task such as a hi-res graphics processor.

If you have any ideas for applications, or would like to know more about the Novix chip and the Contache, er, supercomputer, please drop me a line care of *Your Computer*, PO Box 227, Waterloo 2017 NSW, or give the chaps at Maestro a call. □

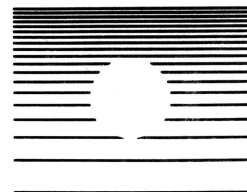
A Forth Symposium

AS A RESULT of the interest shown in Forth in recent months, Paul Walker of the NSW Institute of Technology and myself have decided to hold a combined Forth Symposium/Workshop on 18 and 19 May, 1988.

Charles Moore (himself!) will be coming to Australia to perform the role of keynote speaker and to give a paper on the developments of the Novix chip set. It is expected that registration will cost in the vicinity of \$100 (the whole operation is being planned as non-profit venture). The event will be a joint symposium/workshop, with papers being presented on a wide range of Forth topics. Exhibitions from industry specialists in Forth applications will also be provided. □

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THE ATLANTIS 386

We never suspected John Hepworth of being a speed junkie, but all it took was a little taste . . .

WHO NEEDS more speed in their PC? I can think of three people right off the top of my head: I, me and myself. Yes, I'm a speed junkie. Having tasted the thrills of the Atlantis 386, I found going back to my pedestrian PC had all the pangs of going cold turkey. So, what is the Atlantis 386? Like the Compaq 386 it is essentially an AT clone with an enhanced processor, offering excellent AT compatibility with greatly increased speed. Physically it resembles the traditional AT in size and colour.

The system unit is much like the familiar IBM AT unit at 540 mm wide, 150 thick and 420 deep. The front panel has an AT style lock for case and keyboard, a reset button, speed indicator and hard disk activity LEDs. That reset switch is much more than a convenience, as the standard Ctrl-Alt-Del used by IBM does start the re-boot sequence but it hangs partway through.

On the rear panel is the power inlet socket, a switched power outlet socket for monitors and the ventilation fan outlet. Also on the back panel are the apertures for the 8 expansion slots. With other machines, many users will have had the problem of adding more ports, such as a second serial port cable to a multi I/O or similar board, and having to drape the cable over the back panel. No problem with the Atlantis, as there are additional apertures in the back panel for permanently fitting three DB25 connectors and two DB9 connectors.

Inside is the familiar mother board, with 80386 CPU and 80287 co-processor. The Atlantis 386 motherboard has eight expansion slots — one is 32-bit and holds the memory card, two slots are 8-bit and the remaining five are 16-bit. Only four slots were occupied by the video board, memory board, serial/parallel input/output board and the disk controller. There are acres of spare space, though with two more drives and all eight slots filled, cable routing could become an interesting exercise if neatness is to be maintained. Construction quality was good.

The rear panel of the I/O board has a 9-pin male connector for the serial port and a 25-pin female connector for the parallel port. Header pins inside allow for connection of a cable for a second serial port. The video board has a 9-pin female connection, two RCA concentric connections, and an 8-way DIP switch, all accessible on the back panel.

Drives

Five half-height bays are provided for drives. One 1.2 megabyte 5¼-inch floppy drive is visible at the right hand side of the front panel, with blanking plates over the slots for two more half-height drives. To the left of these three bays, and hidden by the case are two more half-height slots for use by either two half-height or one full-height, hard disks. The normal AT rails and retainers are used to mount the drives. The 1.2 Mbyte drive was reliable when writing disks to be read by similar drives, though as is usual with the



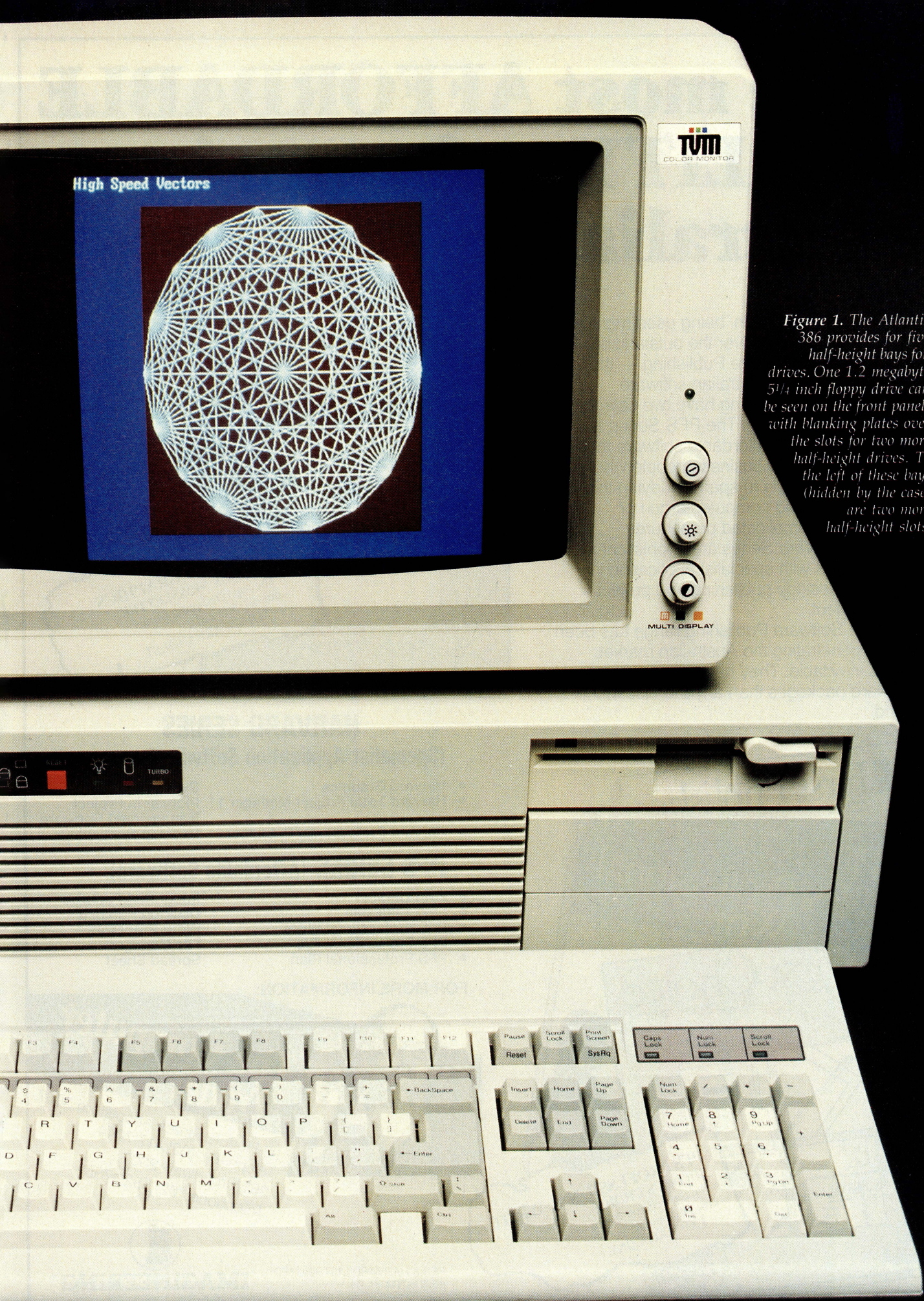


Figure 1. The Atlantis 386 provides for five half-height bays for drives. One 1.2 megabyte 5 $\frac{1}{4}$ inch floppy drive can be seen on the front panel, with blanking plates over the slots for two more half-height drives. To the left of these bays (hidden by the case) are two more half-height slots.

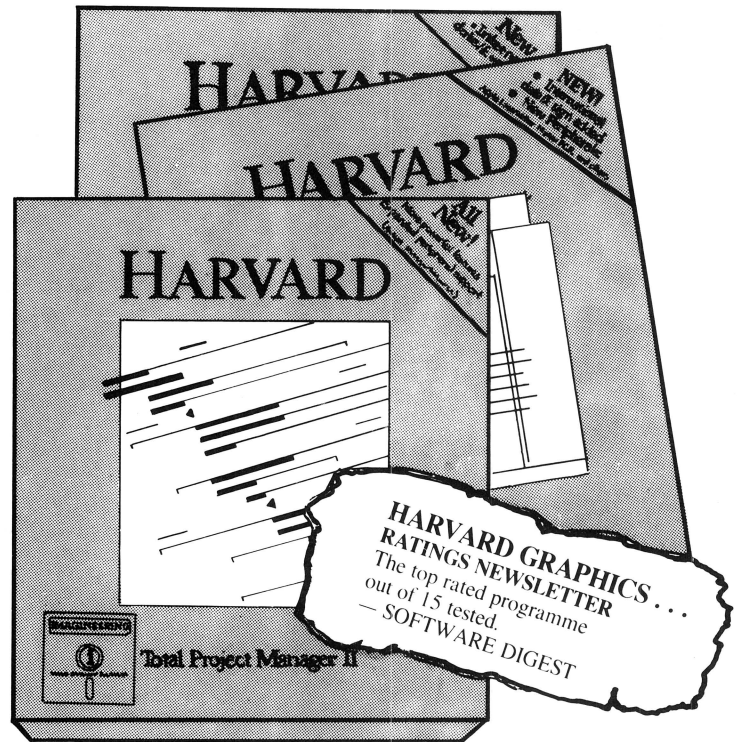
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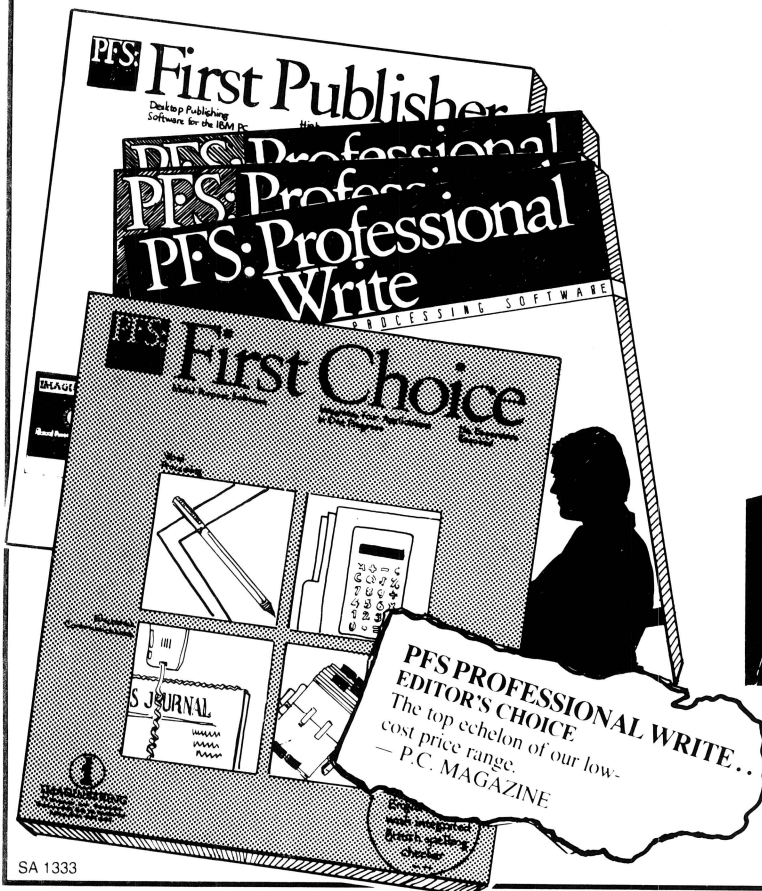
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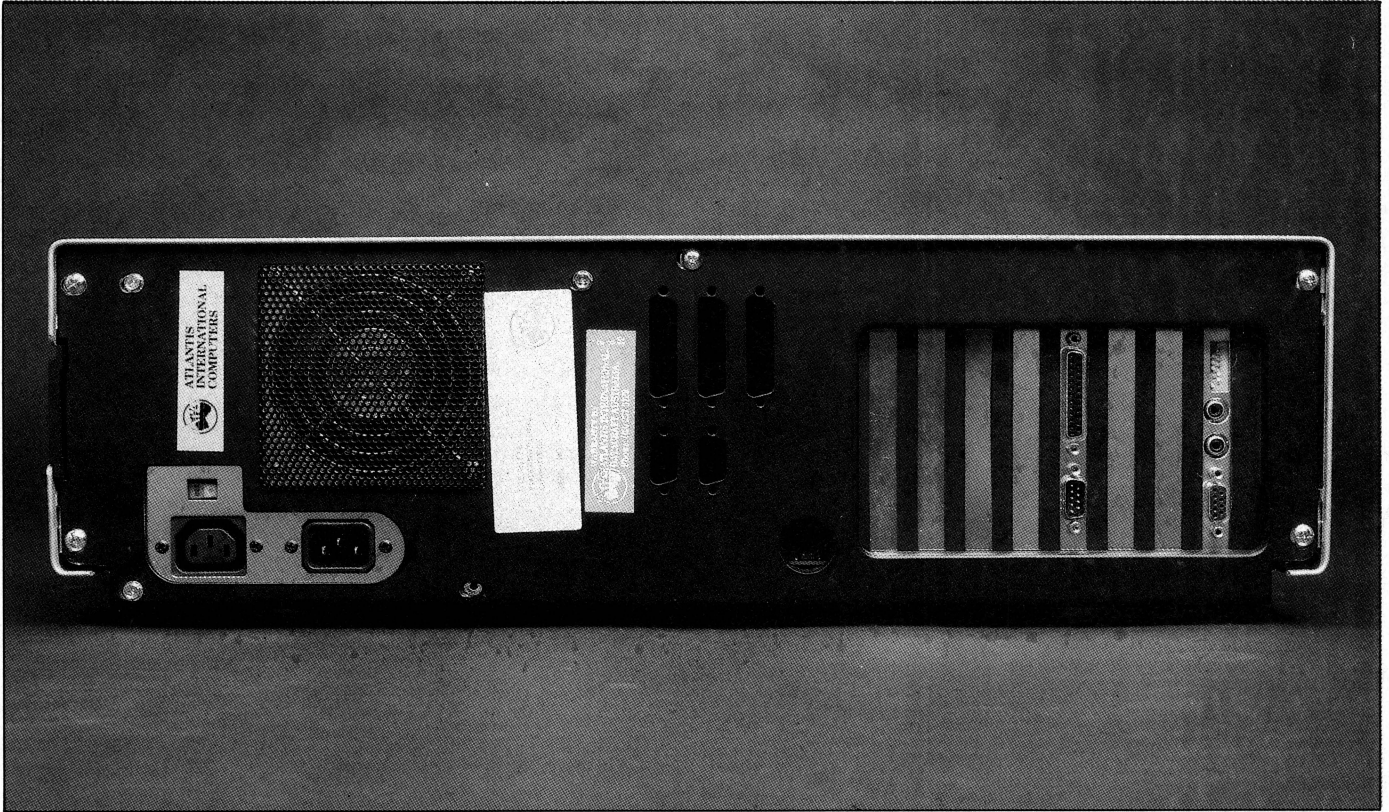


Figure 2. The rear panel of the AIC 386 carries the power inlet socket, a switched power outlet socket for monitors and the ventilation fan outlet, plus the apertures for the 8 expansion slots. Adding more ports is no problem with this machine — there are additional apertures in the back panel for permanently fitting three DB25 connectors and two DB9 connectors.

1.2 Mbyte floppy drives, normal PCs could not reliably read 360 kilobyte disks written to by this drive.

The hard disk was a 40 Mbyte 5¼ inch NEC, formatted in two logical partitions, of approximately 30 and 10 Mbytes. Hard disk performance was extremely good, with Coretest giving average seek of 11.7 milliseconds, track to track seek of 7.5 milliseconds and 169 kB per second data transfer rate. Other, more general benchmarks, indicated that the average seek figures might be a little optimistic, however in practical use the awesome speed was more than welcome.

A full length disk controller card with 16-bit connection to the system bus was used for both the floppy and hard disks. While it bore no visible identification, many of the chips appeared to be Western Digital. The floppy cable has a spare connector for a second floppy while a spare set of header pins and a second connector on one of the hard disk ribbon cables implied that another hard disks could be connected.

Video and Monitor

A vast range of video boards and monitors could be fitted and used with the Atlantis AIC 386, but the review unit came

with the Everex Micro Enhancer EV-657B video board and a TVM Model MD-7E dual mode EGA/CGA monitor.

The Everex board can be used with CGA, EGA, TTL mono (like the IBM mono monitor) and Multiscan monitors. It can accept output intended for Hercules, MDA, CGA and EGA, and some extended modes, and translate it for many of the supported monitors. Autoswitching can be enabled so that the board detects the monitor connected and adjusts itself accordingly, or the mode can be set via dipswitches or software. A full test of the board would require a flock of different monitor types and an article all its own and so it was only used with the TVM monitor for this review.

The monitor has three knobs at the lower right of the front panel: the top one is a rotary on/off switch; the bottom two control contrast and brightness. A concentric knob around the bottom control sets the display to colour, green or amber. Rear monitor controls were vertical and horizontal size and centering.

The combination of the Everex board and the TVM monitor was very successful, giving clear text, good colour and excellent graphics. It was easy to read, sharp, and has a range of brightness to suit any-

thing from a window position in the office to a dim room at home.

Power Supply

The 200 watt power supply is located in the traditional place towards the rear of the system unit and across to the right. It has six connectors for output: two are used for the the mother board, one each for the hard and floppy disks and two are spare, for future installation of extra drives.

Keyboard

The AIC 386 comes with a keyboard in IBM's so-called 'enhanced' layout — it has 101 keys with 12 function keys in a row across the top. It bears no maker's name, but has the model number FK 555. While I prefer the old XT keyboard layout to the AT keyboards and all the 'enhanced' variations, this one's layout is as good as most. The feel is good, having a light action with 'over centre' operation and good tactile response. A quiet mechanical 'click' is heard on depressing a key, giving good auditory feedback. Three LEDs at the top right corner of the keyboard illuminate when Caps Lock, Num Lock or Scroll Lock are on and default to OFF when the system is booted. The keyboard comes with a

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quite complete 27-page A5 manual, which even shows the use of the function keys under DOS and BASIC.

Small legs on the underside at the rear can be swung out to raise the keyboard to a more usable position. Cord length is generous, with a straight portion long enough to reach from the connector on the rear of the system unit to the front, and then a coiled section to automatically extend and retract as the keyboard is moved.

Compatibility

The AIC 386 uses a BIOS from Award, Version 2.07. It, and the machine, seemed very compatible with all the standard DOS applications at my disposal. In addition, it was used in the *Your Computer* office for some time before I got my hands on it, with no problems. A very extensive range of communications software was run on it, including a test of the Your Computer Opus Bulletin Board system. All the standard set of commercial software, including Microsoft Word, Lotus 1-2-3, LapLink, Xtree and many more, all ran without hesitation. Jet and Flight Simulator both ran, at rather increased speeds, though the 'enhanced' keyboard layout is somewhat less than ideal for both. All my usual public domain software ran perfectly, including one program that chokes the IBM PS/2 Model 30.

Compatibility confirmation when running with OS/2 will have to await availability of that product and of suitable testing software to run under it. Unix, Xenix and the like were not tested.

Documentation

The documentation was good, bad, indifferent and dreadful! The DOS manuals (including GWBASIC) were the usual two Microsoft ring binders, with the usual excellent contents. The video board manual, 54 pages, A5 in size and looseleaf for inserting into your PC-DOS manual, was well written and illustrated. The 16-page monitor manual was well illustrated, but rather brief, and the keyboard manual quite good. The serial/parallel card manual and the system unit manual were but a few scrappy, photocopied pages in Asian English.

Software

The system came with quite a range of utility software. First and foremost was MS-DOS 3.2 and GWBASIC. Three disks were for low level formatting of the hard disk and similar tasks, system setup software and diagnostics. One of the more im-

portant programs has an significant effect on increasing speed, by relocating the ROM BIOS and/or EGA ROM to high speed RAM. The Everex video board came with its own disk of utility software.

I really did not want to like this machine so much, the speed being completely addictive, especially for writers who want instant search-and-replace, instant spell checking and fast loads and saves.

Conclusion

I really did not want to like this machine so much, the speed being completely addictive, especially for writers who want instant search-and-replace, instant spell checking and fast loads and saves. Database users will adore the way the AIC 386 gives any database software fast indexing, reporting and other functions. All other users will love that speed. I used the Atlantis AIC 386 for several weeks and only gave it back when it was prized from my grip with a crowbar. Reliability seemed excellent over this long test period, and compatibility with DOS and DOS applications is excellent. The only negative vibes came from the system unit documentation, where great improvements could be made.

Now, how am I going to persuade the bank manager that I really must have one for home? □

Product Details

Product: AIC 386

Distributor: Atlantis International Computers, 49 Wadham Pde, Mt Waverley 3149 Vic.
(03) 277 3139

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\$575 10 Mbyte hard disk; \$765 20 Mbyte; \$1100 30 Mbyte; \$1800 40 Mbyte.

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Part 2.

ZOOM
BOARDS

Peter Feldtmann continues his search for speed and the Zoom Board of his (and Zebbie's) dreams — he's found three inexpensive boards, one of which may be the tonic for your tired old PC.

IN MY never-ending search for speed, a number of Zoom Boards have passed across my desk, spent a brief interlude inside Zebbie and been sent packing. And I am still looking for the ultimate accelerator! The boards covered here are of the less expensive variety and may be just what the doctor ordered for your tired, slug-mode PC.

The AMB 286-Speed Card

The 286-Speed Card, from American Business Machines, is a short card accelerator designed to fit the short slot in the IBM-XT. Like so many other short card accelerators, this one requires the 8088 processor to be moved from the main board to its new home on the card.

The board comes packaged in a small, well-padded box which also contains a short 40-way cable, and a user manual. No software is provided, as switching between turbo and normal speed modes is achieved with a hardware switch mounted

on the rear of the card. The clock rate for the 286-Speed Card is 7.2 MHz, if one is to believe the documentation.

Installation of the Speed Card is as painful as it is with most of the other short accelerator boards I have become acquainted with and consists of removing the 8088 processor and replacing it with the 3 inch cable provided: inserting the processor into one of the vacant 40-pin sockets on the speed card (the other one is for the optional 8087 co-processor) and placing the card into the vacant slot nearest the 8088 processor's original home. The only jumper on the board is for selecting the clock rate (5 or 8 MHz) for the optional 8087 maths co-processor.

The manual supplied with the 286-Speed Card is a small, 23 page booklet containing installation instructions, diagrams and several pages of glossary —

neat, tidy and containing quite a smattering of creative English. However, the manual suffers from the slight problem that all the text and diagrams refer to another and entirely different board.

Digicom Digis 80286A

The Digis accelerator is a three-quarter length board and makes use of the 8088 in much the same way as the 286 board mentioned above. The board is supplied in an anonymous white box containing the accelerator card, a 5 inch 40-way cable and the user's manual. Switching between turbo and normal speed modes is achieved by a switch mounted on the rear panel. There is also a second switch provided for turning the cache facility on and off.

Installing the board requires the re-

removal of the 8088 processor from the main board and inserting it in one of the 40-way sockets provided, and then inserting the 40-way cable in the vacant 8088 position, and pressing the card home into the slot closest to the power supply.

Then, secure the card and — with heart in mouth and stiff drink in hand — turn on the power and go.

The user's manual is an 18 page booklet containing all the information needed to get the Digis card up and running. It gives a general overview, a clear and concise explanation of cache memory, installation and usage instructions, and a brief technical specification. All in all, this is a very good little manual (although no matter how much you bend it, it won't stand up straight on the table).

Unlike any accelerator I have thus far encountered, this board disables the cache memory on power up for approximately 2 minutes. This is to ensure compatibility with a very broad range of machines and BIOSs by not fouling up the power on self-test. (I have yet to find a board that does irritate this test, but the facilities which manufacturers build in are seldom redundant.)

Turbo Upgrade

The Turbo Upgrade is by far the smallest accelerator on the market today. Unlike the other accelerators, this card does not use an 80286 at all. Speed improvements are gained solely by increasing the clock rate of the resident processor. Switching between turbo and normal speed modes is achieved by either a hardware switch or one of the software drivers provided.

Installing the Turbo Upgrade is not an exercise for the faint-hearted, involving the use of screwdrivers, an electric drill or hole-punch, and possibly even a soldering iron. Burning fingers aside, installing the board goes like this —

- 1) Undress the computer by taking the case off (don't worry — it's not shy.)
- 2) Locate the 8284a (it's generally located somewhere near the 8088 processor).
- 3) If the 8284a is socketed, then remove it carefully; otherwise de-solder this component and replace it with a socket. (Scorched fingers here I come!)
- 4) Plug the 8284a into the Turbo Upgrade board.
- 5) Plug the Turbo Upgrade into the 8284a socket on the main board.
- 6) Clip the flying lead to pin 20 of the 8255. The 8255 is located near the right hand side of the main PC board.

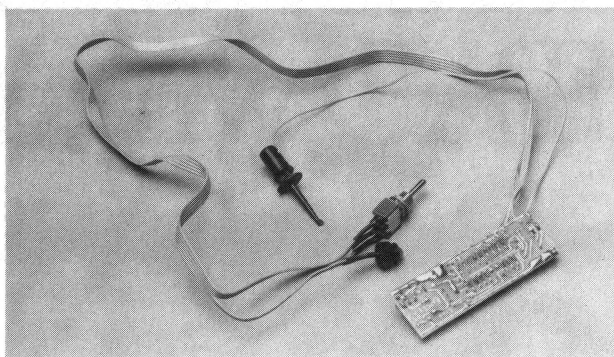


Figure 1. Unlike the other accelerators, the Turbo Upgrade does not use an 80286 at all. Speed improvements are gained solely by increasing the clock rate of the resident processor.

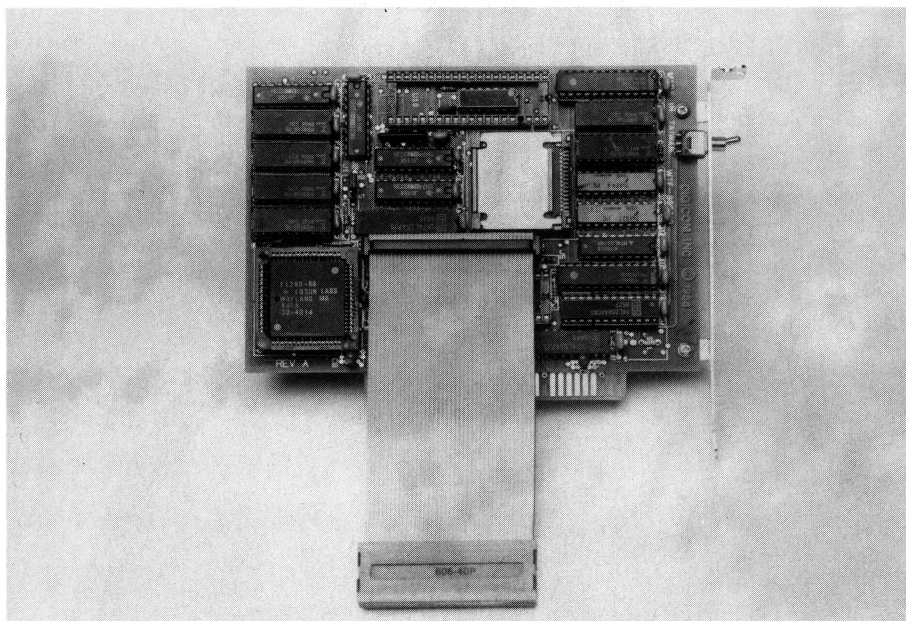


Figure 2. The 286-Speed Card is designed to fit the short slot in the IBM XT. Like so many other short card accelerators, this one requires the 8088 processor to be moved from the main board to its new home on the card.

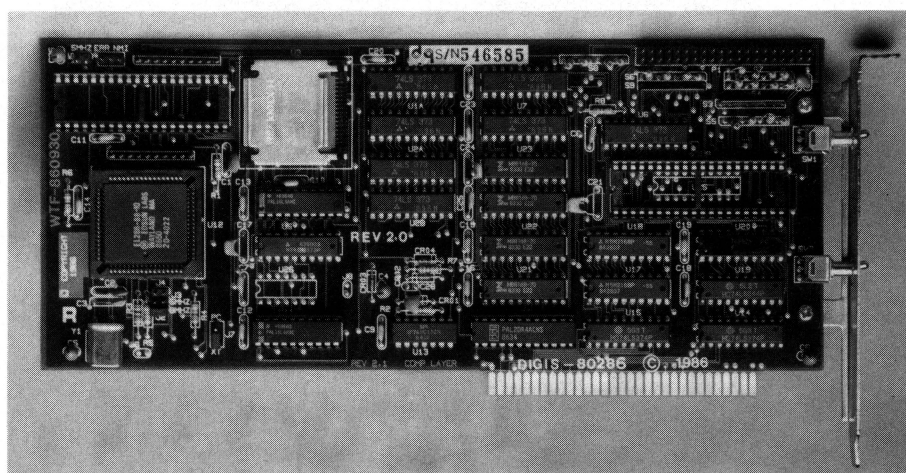


Figure 3. The Digicom Digis accelerator is a three-quarter length board. It's unusual in that it disables the cache memory on power up for approximately 2 minutes; this ensures compatibility with a very broad range of machines and BIOSs.

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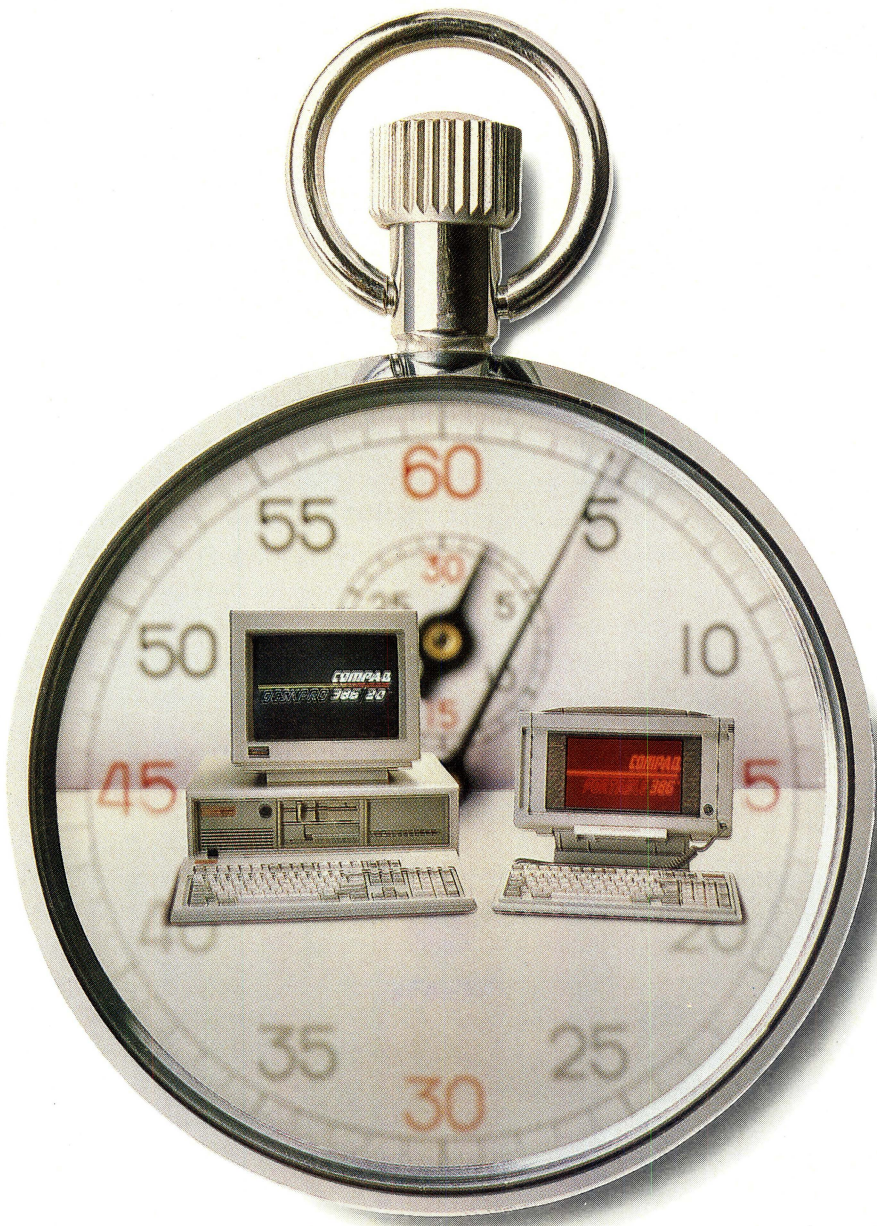
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7) Select a position for the switch and indicator LED and drill or punch holes for these (this step is optional as you may not wish to use the switch).

8) Select and insert the crystal (which determines the speed) in the board.

9) Finally: install the software driver — this consists of copying the utility programs onto a boot disk and placing the following line into the CONFIG.SYS file:

DEVICE=TURBOHF.COM

The selection of the crystal is by far the most important part of the operation, as this component will determine just how much faster your computer will run. There are two crystals provided with the Turbo Upgrade — one is a 20.000 MHz crystal which will give a clock rate of 6.67 MHz, and the other is a 22.000 MHz crystal, giving a clock rate of 7.33 MHz. A further upgrade can be achieved with a 24.000 MHz

crystal providing a clock rate of 8 MHz. In most cases, no other changes to the computer will be necessary to achieve the 6.67 MHz and 7.33 MHz speed upgrades, although some machines may not run reliably any faster than 6.67 MHz. To achieve the 8 MHz clock rate you will need to purchase an 8088-2 processor and faster RAM — if the RAM in your computer is slower than 150 ns.

There are several tests that need to be performed to ensure reliable operation of the Turbo Upgrade. These include attempting to format a disk and using the diskcopy facility at the higher clock rate, and several others. Four device drivers are provided with the Turbo Upgrade to help overcome any problems caused by the increase in clock rate.

The documentation provided is a 16 page booklet, which describes in detail the installation of the board for the IBM-

PC, -XT and close PC/XT compatibles, source code for two of the utility programs, technical details (how it works) and a trouble shooting guide.

What The Tests Revealed!

Now for the fun — look at the results in Table 1. The more alert reader (wake up at the back there) will have noticed that the Norton SI ratings bear little relationship to the actual speed of the boards (so read the table again, already). This is due in part to the way SI performs speed calculation — SI appears to be based on 100 percent clock-bound operations, which is why the rating is so close to that of the board. However, the overall speed of any accelerator is governed by much more than mere clock rate — such factors as wait states and bus width must also be taken into account. In view of these factors, I have included a corrected relative speed factor (CRS) in the benchmark table. This figure is calculated from all the results and provides a more realistic value. Next time you see an advertisement giving a Norton SI rating of X, be warned — this is not a very accurate measure.

Not world shattering-stuff, any of it, but the Digicom board is probably the pick of the bunch if you want a bit of edge. The Turbo Upgrade board, it should be borne in mind, is not an accelerator board as such — it simply bumps up the clock rate. However, it is probably the cheapest way of putting a bit of oomph into the slug on your desk. □

	R.C. Electronics.Digital Resources American Business									
	AT	Zebbie	PC	286 Speed Card		Digis 80286A		Turbo Upgrade		
Price	-	-	-	474.00		1150.00		-	-	-
HARDWARE										
Processor	80286	8088	8088	80286		80286		n.a.	n.a.	n.a.
Clock Speed	6.77	8.0	4.77	7.2 Mhz		8 Mhz		6.77	7.33	8.0
8087	Opt	Opt	Opt	Opt		Opt		-	-	-
Board Size	-	-	-	Half Card		3/4 Card		2.0cm x 6.5cm		
Power Cons.	-	-	-	7 Watts		7 Watts		-	-	-
Speed Change	-	-	-	Hardware		Hardware *		Device Driver & Hardware		
Par. Processing Ability	-	-	-	NO		NO		-	-	-
Standard RAM	-	-	-	Cache		Cache		-	-	-
Maximum RAM	-	-	-	n.a.		n.a.		-	-	-
Wait States	-	-	-	n.a.		n.a.		-	-	-
Mem. Config.	-	-	-	n.a.		n.a.		-	-	-
SOFTWARE										
Mem. Resident Driver	-	-	-	NO		NO		YES	YES	YES
Install prog.	-	-	-	NO		NO		NO	NO	NO
Special Prog.	-	-	-	NO		NO		YES	YES	YES
BENCHMARKS	All	timing in seconds		ON OFF		ON OFF		6.67	7.33	8.00
Turbo mode				ON	OFF	ON	OFF	6.67	7.33	8.00
Disk Write	16	24	37	21	37	21	37	29	26	24
Disk Read	12	20	31	17	31	15	31	24	22	20
Calcs	36	61	96	47	96	44	96	73	67	61
Sieve	117	195	306	141	306	133	306	234	213	195
Compile/Link	40	73	100	64	100	53	100	88	80	73
Total Time	221	373	570	290	570	266	570	447	407	373
Norton SI	5.7	1.5	1	6.2	1	6.6	1	1.3	1.4	1.5
CRS	2.6	1.5	1	2.0	1	2.1	1	1.3	1.4	1.5

Note *: This card also has a cache disable switch

Table 1. The tests were run in PC-speed and Turbo-speed modes; all times in are in seconds. The disk write, disk read, calcs, and Sieve of Eratosthenes programs were all written in standard GWBASIC. The Compile/Link process was performed using Computer Innovations' C86 compiler and Microsoft's overlay linker with no special switches on a C source file of 4600 bytes. Refer to the text for a definition of CRS.

Product Details

Product: 286-Speed Card

From: American Business Machines,
PO Box 1, Berkley Vale NSW 2259
(043) 885 133

Price: \$715 taxed

Product: Digicom Digis 80286A

From: Digital Resources, 169 Phillip St,
Waterloo 2017 NSW; (02) 690 1268

Price: \$870 taxed

Product: Turbo Upgrade

From: RC Electronics

Distributor: Capitol Software,
GPO Box 5247, Sydney 2001 NSW;
(02) 665 6299

Price: \$199 taxed

Note: The price quoted above is for the new version of Turbo Upgrade which uses an 8MHz CPU replacement, the NEC V20.

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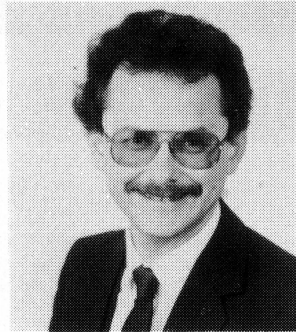
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Why Your Hard Disk May Be Only Seconds Away From Total Failure!

WELCOME TO THE INNER WORLD OF HARD DISKS: WHERE MICROSCOPIC PROBLEMS CAUSE MAJOR CATASTROPHIES.

A typical 20-megabyte hard disk contains over 200,000,000 bits. If *only one bit* changes or fails, you can lose *everything* on your disk. Hard disks are subject to so many inherent, uncontrollable conditions that random failures occur with alarming frequency. You already may have been tortured by one of these hard disk error messages: **DATA ERROR, GENERAL FAILURE, ERROR READING, WRITE FAULT, BAD SECTOR, SECTOR NOT FOUND, FILE ALLOCATION TABLE BAD, DISK ERROR READING FAT, DISK NOT READY, INVALID DRIVE SPECIFICATION, NON-SYSTEM DISK OR DISK ERROR, READ FAULT, BAD DATA, ABORT-RETRY-IGNORE** — plus hundreds more that we simply don't have space to mention. Here is why:

PROBLEM ONE: OUT OF ALIGNMENT. There are hundreds of circular tracks packed into every inch of your hard disk's magnetic recording media. They are *extremely* thin, about as thick as a single strand of hair. Perfectly aligned tracks on a new, out-of-the-carton hard disk look like those in **figure 1**. Your programs read, but *never* write, to any of the special Track and Sector ID areas shown in black.

When your system has been off and is cold — in the morning, for instance — head positioning mechanics shrink, causing heads to read and write towards the inside. As the unit warms they expand and tend to read and write towards the outside. Add friction, wear-and-tear, play, torquing, repeatability, vibration, irregular platter and surface expansion, etc. — and within a very short time your data, program and system sectors can go out of alignment like those shown in **figure 2**. This is a continual, serious problem: valuable data may be written so far off current head tracking that it is no longer readable, resulting in devastating errors and lost data.

Disk Technician™ Automatic AI Software System's early warning detection *must be used daily* to keep data, program and system sectors in perfect alignment. When even the slightest change is detected, Disk Technician safely removes any data and stores it in your computer's RAM, then restores perfect alignment by *rewriting the entire track, including the "read only" Track and Sector ID areas*, using Disk Technician's own *factory low-level, Real format*. This new track is then thoroughly retested, and *only if it has been perfectly repaired*, will Disk Technician allow your valuable programs and data to use it again. If retesting reveals that any bit is not perfect, data is relocated to a good area and the bad area is safely blocked from future DOS use. When Disk Technician repairs an area, it *special monitors* that spot on all subsequent tests to make certain it *stays* repaired. *This is a totally automatic, unattended process.*

PROBLEM TWO: MEDIA AND DISTANCE. The typical distance between the head and the media is about 25 millionths of an inch. By comparison, a smoke particle is about 10 times greater and a human hair is over 100 times greater! Expansion and contraction caused by normal heating and cooling, wear-and-tear, media degradation, vibration, humidity, platter wobble and aging all cause this distance to vary (see **figure 3**). *Read and write quality varies directly with these distance changes.*

No matter how carefully the hard disk media was manufactured, there still will be variations in coating thickness, smoothness and magnetic density (see **figure 3**). Add aging and magnetic retentivity changes, and some spots may change from "good" to "unreliable" *overnight*. Magnetic hard disks act just like old photos: they fade away — along with your data! *Disk Technician is the only total solution to these problems.*

Disk Technician *reads, writes and tests every single bit on the hard disk, occupied or not*, using special proprietary testing and repair algorithms to check for soft error rate, magnetic retentivity, and the ability to read and write *perfectly*. If even the smallest marginality or error is found, Disk Technician will automatically proceed with its complete repair and restoration process. DOS and other programs can only tell you after 10 to 30 errors have been made. Our testing reveals that once a spot makes more than 3 to 5 soft errors, total failure is imminent. *Disk Technician's daily preventive testing, repair and recovery is the only real cure.*

PROBLEM THREE: POWER. Static electricity, turning power on-and-off, brownouts, surges, spikes and static electricity all can cause the heads to write meaningless "garbage" into whatever tracks they happen to be located over. Although hard disks and computers are designed to minimize accidental head writes, they *still* occur and cause devastating damage — often wiping out an entire disk. *Disk Technician takes a new approach to cure these problems.*

When Disk Technician is run, it automatically installs SafePark™ memory resident software program and creates a "safe zone" on your hard disk, safely relocating any data in this area. Then, whenever you boot from your hard disk, SafePark becomes memory resident and operates with all of your programs all of the time. When there is no disk activity for approximately 7 seconds (user adjustable), SafePark automatically moves the heads to the safe zone. Once the heads have been moved — which will almost *always* be the case — and there is static electricity or a power glitch, any damage will be confined to the safe zone: *protecting your valuable data and programs.*

WHY SUFFER AND TORTURE YOURSELF WITH HARD DISK GRIEF? Disk Technician virtually eliminates *all* your problems! It is so easy to use — *absolutely no technical skill is needed* — and takes less than 60 seconds of operator time daily. **BUY NOW! HEAD-OFF HARD DISK DISASTERS BEFORE THEY COST YOU TIME AND MONEY!**

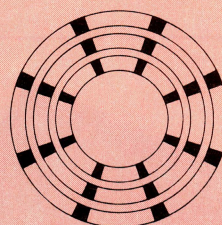


Figure 1* Perfectly aligned tracks. The black areas are "read only." These store *critical* track and sector ID information. The white areas are data sectors and store your system, programs and data.

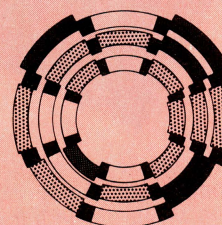


Figure 2* Sectors out of alignment with the track. The most frequent cause of lost or unreadable data. See Problem One.

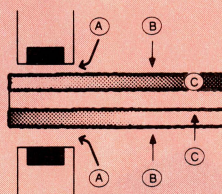


Figure 3* Heads, media and platter. A: The distance from the heads to the media continually changes. B: The magnetic coating varies in thickness and smoothness. C: Magnetic retentivity varies and decays. See Problem Two.

*Magnified and simplified for clarity.

Disk Technician™

Automated AI Software System

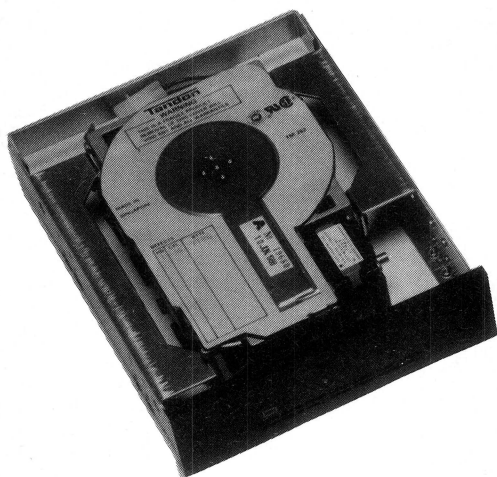
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- Can selectively test and repair any and all cylinders, heads and sectors in the DOS partition.
- Requires PC or MD-DOS version 2.1 to 3.3 with 256K of RAM.
- Requires a single 5 1/4" floppy drive.

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Four of a kind, or two pair

John Hepworth drew two hard disks and two hard cards — which would you ante for?



The Tandon 262 21 Mbyte half-height 3 1/2 inch hard disk (above) and the PTI 49 Mbyte 3 1/2 inch half-height disk drive (right) — the only problem likely to be encountered during installation is connecting the ribbon cable correctly.



I HAVE JUST been testing four hard disks for IBM PCs and compatibles. Based on 3 1/2 inch mechanisms, they could be considered as four of a kind, except for the fact that two are mounted on cards, and the other two are half-height drives which mount conventionally in a drive bay. Two are 21 Megabyte and two are 49 Mbyte.

The drives tested were: the Tandon BusinessCard 21 hard card, the Tandon 262 21 MByte half-height 3 1/2 inch hard disk, the Interface 49 Mbyte I2CARD hard card, and the PTI 49 Mbyte 3 1/2 inch half-height disk drive. Very quickly they divide themselves into two pairs, not the hard cards versus the rest, but the 21 Mbyte units and the 49 Mbyte units. Why? Because both the 21 Mbyte units use similar drive mechanisms from Tandon and both the 49 Mbyte units use PTI drive mechanisms.

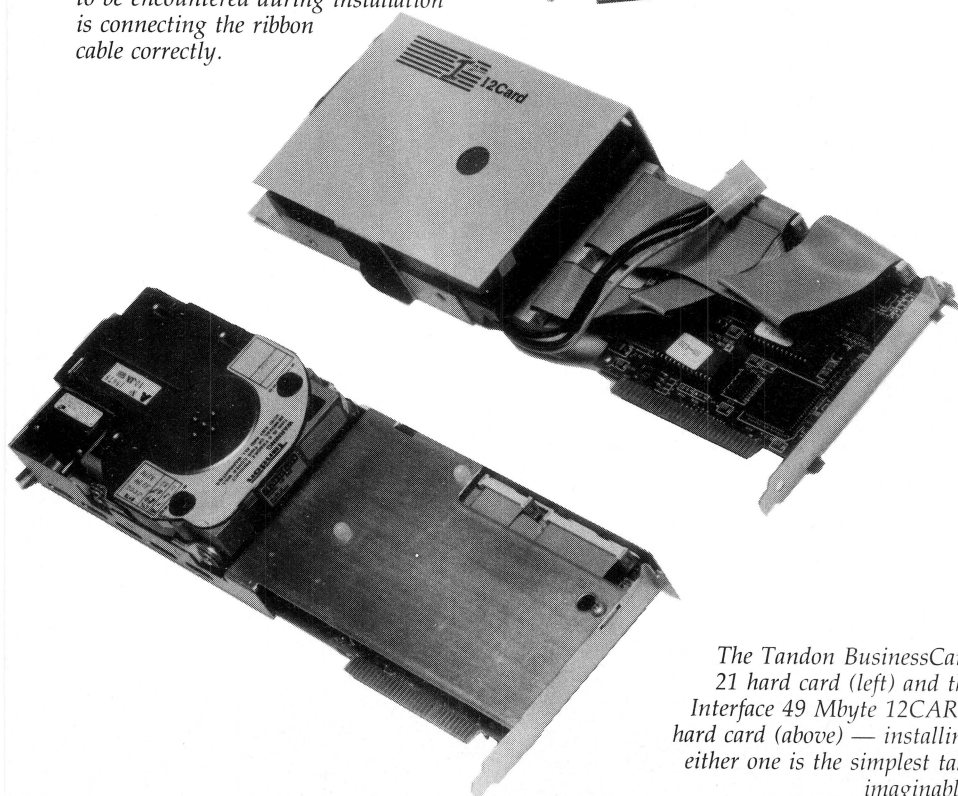
The controllers do vary, as both the 49 Mbyte units use OMTI controllers from SMS, while the Tandon 21 Mbyte unit uses a National Computer controller and the BusinessCard 21 controller card bears no manufacturer identification.

So, if all the drives have similar size mechanisms and all the controllers are half length, what are the differences?

Both the hard cards take a conventional half-height drive and separate controller card, and mount them on a sheet metal bracket which slips into a slot of a PC. The conventional drives are mounted in one of the floppy drive bays and cabled to a short controller card mounted in one of the expansion slots.

However, both the hard cards do take up more than one card slot. If you consider a metal bracket running from the rear panel of your machine to the front panel, it will be just over 340 mm long.

Both the BusinessCard 21 and the I2-CARD mount a drive on the half of this bracket near the front of the machine and a controller card towards the rear of the bracket above the expansion slots. At the controller location both are just one slot wide. At the drive position both are double the width, and take up two slots. This doesn't stop a user installing another card in the slot that the drives overlap, but only half length cards will fit.



The Tandon BusinessCard 21 hard card (left) and the Interface 49 Mbyte I2CARD hard card (above) — installing either one is the simplest task imaginable.

Installation

Installing the cards is the simplest task imaginable. Open the cover of your machine, having first turned off the power. Determine a slot location for the card, and relocate existing cards if necessary. Remove the screw holding the expansion slot cover and remove the cover.

At this point, the procedure for fitting the two cards diverges. With the Tandon, a number of brackets are supplied and may be fitted to the nose of the main card bracket depending on the type of computer to which it is to be fitted. The front end of the Interface card is supported on a sponge rubber pad which bears on whatever chips lie beneath it — the only negative in an otherwise excellent design.

Now plug the card into the expansion slot connector on the mother board. Power for the Tandon card comes from the expansion connector; power for the Interface card comes direct from the power supply via a 4-pin plug of the same type used to power a floppy drive. Some older PCs may not have enough power output connectors, but Y adapters are available.

Power consumption is a different story. Earlier PCs had a power supply rated at 63 watts. This is generally considered marginal for use with hard disks in fully expanded machines, even with power misers like the four hard disks tested. Most clones, XT's, and suchlike have a power supply rated at 150 watts or more and should have no problem.

So, if all the drives have similar size mechanisms and all the controllers are half length, what are the differences?

Mounting the conventionally packaged drives is a little more confusing. Both slide directly into a floppy bay and are secured by screws. In each case, two ribbon cables are run to a separate controller card mounted in one of the expansion slots. In both cases, the instructions were barely adequate for a user with experience in fitting cards and accessories to PCs, and would be downright confusing for a novice. The main area of difficulty? Knowing exactly how to connect those ribbon cables. I got it right the first time in both

Drive	Size	Data Transfer Rate (Kilobytes/second)	Average Seek Time (Milli Seconds)	Track To Track Seek (Milli Seconds)	Performance Index
Tandon BusinessCard 21	21 Megabyte	139.9	97.3	16.2	1.398
Tandon 1/2 Height	21 Mbyte	77.5	80.4	16.1	1.145
Interface Inc 12 Card	49 Mbyte	159.5	34.8	9.1	2.581
PTI 1/2 height 49 Mbyte	49 Mbyte	243.2	31.7	9.8	3.184

Table 1. All four drives were tested with the Coretest program. Both the Tandons have acceptable (but not startling) speed, basically similar to the speed of the standard drives in an XT; the PTI and Interface drives were significantly faster than the Tandons — as you'd expect after taking price and intended market into consideration.

cases (I was lucky), but it would be easy to mess it up.

All four of the drives came to me fully formatted and with DOS installed, so I can't comment on any difficulties in this line. Micro General, the importers of the Interface card and the PTI drive, fully format all drives before shipment as a matter of policy, both as a service to their customers and as a final quality control check.

Performance

DOS can only address a drive of 32 Mbyte or less, so the PTI and Interface drives are formatted as two separate logical drives in one physical unit. As delivered, they were a 32 Mbyte C drive, and the rest was a D drive.

I tested all four with the well known Coretest program from the American drive manufacturer, Core International Inc, and the results are summarised in Table 1. Both the Tandons have acceptable (but not startling speed), basically similar to the speed of the standard drives in an XT. The PTI and Interface drives were significantly faster, with average access times of 31.7 and 34.8 milliseconds, and track to track seeks far faster than the Tandons — as you'd expect after taking price and intended market into consideration.

Summary

I used the drives over a period of several weeks and came to like them all. My favourite is the PTI half-height, both for its speed and its overall design. I would be more than content with any of them, but for the moment I must dream, save my shekels, and wait to replace my venerable 10 Mbyte hard disk with something like those tested. □

Product Details:

Product: 49 Mbyte I2CARD

from Interface Inc

PTI 49 Mbyte Drive

from Peripherals Technology Inc

Distributor: Micro General

58 Atchinson St

St Leonards NSW 2065

(02) 439 8400

Price: 49 Mbyte I2CARD \$1790 taxed

PTI 49 Mbyte Drive \$1590 taxed

Product: BusinessCard 21 and 262

From: Tandon, California USA

Distributor: Adaptive Electronics

418 St Kilda Rd,

Melbourne Vic. 3004

Price: BusinessCard 21 \$1250 taxed

Tandon 262 21 Mbyte hard disk \$1100 taxed

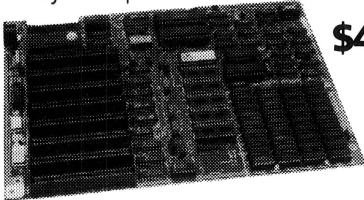
Micro General 49er

WHILE John Hepworth was reviewing the Interface 49 Mbyte I2CARD, Micro General announced they would be producing a local version, the Micro General 49er. We understand the price and specifications will be the same for the two cards. □

10MHz TURBO PLUS MOTHERBOARD

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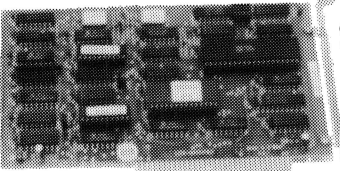
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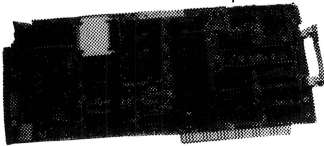
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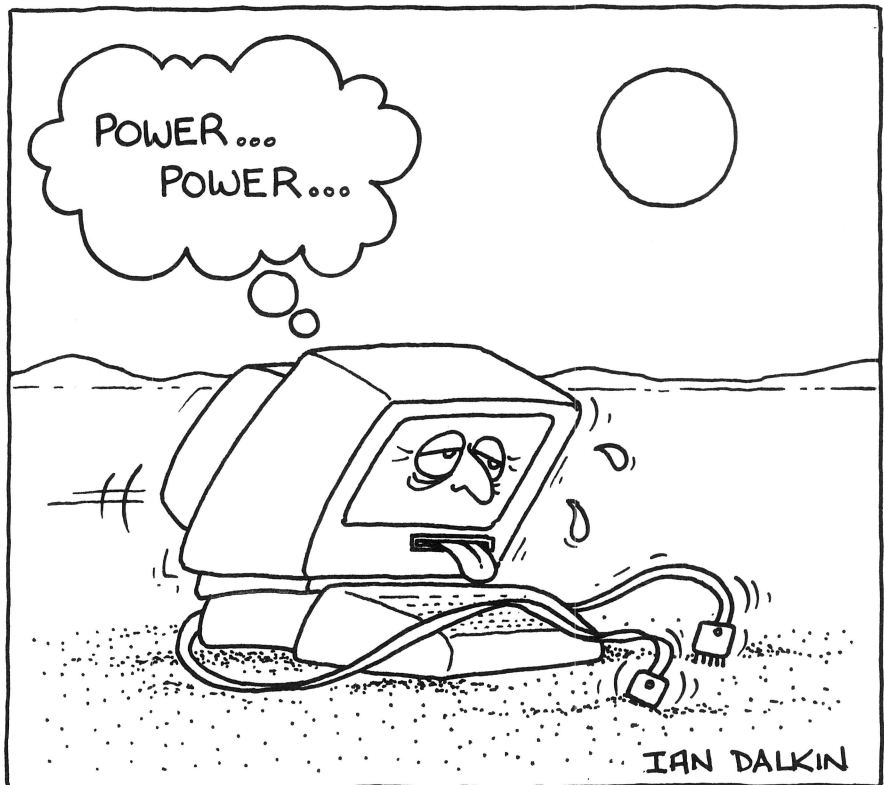
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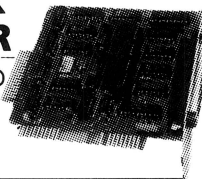


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Controls up to 4 DS/DD 360K drives.



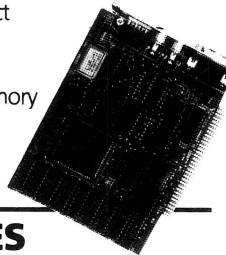
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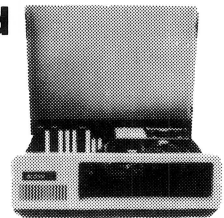
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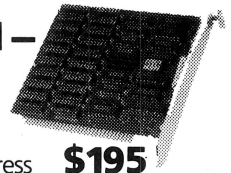
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- DIP switches to start address

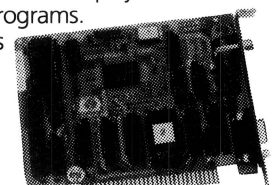
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This amazing new card drives RGB colour, composite colour or a TTL monochrome monitor. And it fits in a short slot. Full CGA support. Can be used as a colour graphics card with a monochrome display and still run all the colour programs.

The card even cures the dread colour graphics "flicker and snow".

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Colour Graphics Video Card

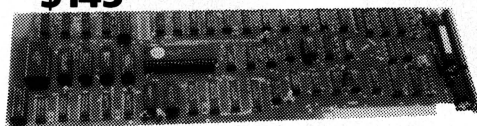
- Suits RGB and composite colour monitors
- Light pen interface
- Fully CGA compatible
- 40 x 25 & 80 x 25 (text), 640 x 200 (mono) and 320 x 200 (colour)

\$115

Colour Graphics/Printer Adaptor

Attaches to IBM-compatible RGB monitor; provides complete compatibility with IBM Colour Graphics Adaptor. Equivalent to the IBM colour/graphics adaptor with additional printer port to replace the video port originally supplied by IBM.

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Parallel Printer Card

- Standard TTL level ■ Centronics printer port, full IBM, EPSON compatible

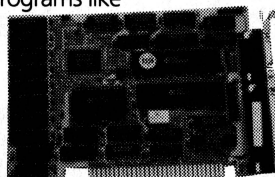
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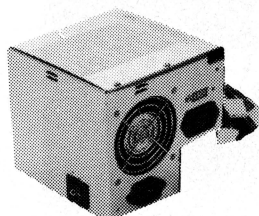


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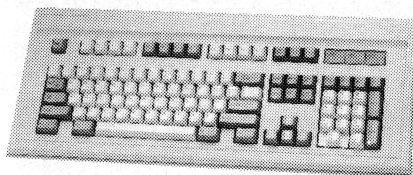
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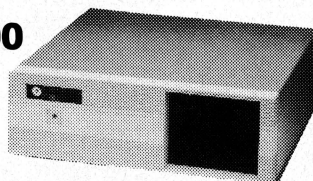
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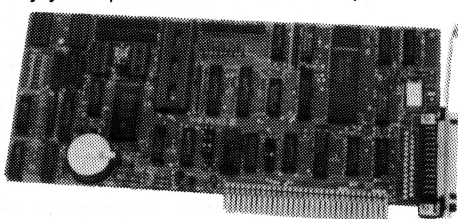
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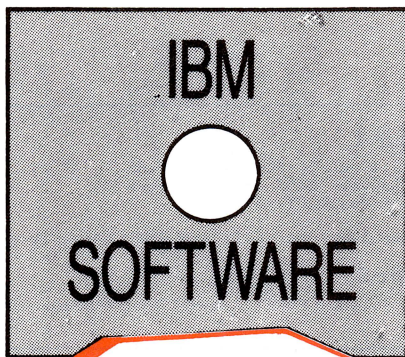
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Your Computer's Bulletin Board

How Do I Download? Bulletin Boarding in one easy lesson . . .

PROBABLY THE most frequently asked question we hear regarding the Board is: How do I Download files? That's a complicated question to answer, since there are a number of steps involved. Guided by our Sysop, Andy Farkas, we'll run through the menus and some of the choices you'll be offered . . .

After you've connected to the Board, the first screen you'll see asks you to log on (see Figure 1). After you've logged on the first time, the Board will recognise your name and it can be entered on one line, as in Figure 2. That single line, with its three 'words,' answers all three questions — it's an example of the 'chaining of commands' that the Board supports. For example, if you can remember the series of questions you'll be asked to get to an area of the Board, all you've got to do is type in the answers (on one line, separated by spaces) and you'll be there — try it.

You'll then go through the secret password rigamarole and be presented with the Bulletins Menu (Figure 3). The first three options on all give extra info on the Board and M gets you to the heart of the system, the Main Menu. If you need to change any of the settings for your particular terminal, then select T for Terminal Setup — especially if your screen has a lot of gibberish like this on it —

```
[40:36mUser name
[0:40:36mCity
```

You get rid of that by toggling ANSI graphics with G in the Setup Menu, shown in Figure 4.

You can get back to the Main Menu with Q, and then D for the Download Areas (you could have chained that with QD). Just to make sure we're talking about the same thing: the terms Up- and Down- load are relative, so Upload to the YC Board, say, means your computer is sending a file and Download means it's receiving; as far as the Bulletin Board is concerned, it's doing the opposite.

After entering D, new users (and visi-

tors) are presented with the 'abbreviated' Files menu (Figure 5). New users are only allowed to look around. For security reasons only registered users are allowed to send files to the board (and even then the programs are all checked out before they're put up for general consumption); and, of course, only regis-

Figure 1.

```
What is your FIRST name: Fred
What is your LAST name: Fredson
Fred Fredson [Y,n]?
```

```
Please type your CITY and STATE: Alex, Vic
```

Figure 2.

```
What is your FIRST name: Fred Fredson y
```

Figure 3.

```
BULLETINS MENU: Type ? by itself for help.
```

```
B = Bulletins           [29-Sep-87]
N = New Users           [25-Sep-87]
P = Policies             [17-Aug-87]
M = Main menu
```

```
Select: M
```

```
MAIN MENU: Type '?' by itself for help
```

```
M = Message Areas      D = Download Areas      G = Say Goodbye      S = Your Statistics
A = Ans Questions      B = Bulletins          T = Terminal Setup  U = YC's Users
E = Extra Info         V = Opus Version
```

```
Select: T
```

Figure 4.

```
The CHANGE SETUP Section.
```

```
User name.....Fred Fredson
City.....Alex, Vic
```

```
Help.....NOVICE          Nulls.....0          Tabs.....YES
scrn.Width...80            scrn.Length 25        Scrn. clear YES
More?.....YES             Graphics....NO
```

```
CHANGE MENU: Type '?' by itself for help
```

```
H = Set Help Level      N = Newline Pause    W = Screen Width    L = Screen Length
T = Send <Tab>'s        M = More? On/Off     G = ANSI Graphics   S = Screen Editor
C = Clear Screen        Q = Quit to main
```

```
Select:
```

Figure 5.

```
The FILES Section.
```

```
File area # 1 ... New uploads and programs for September
Type '?' by itself for help
```

```
A = Change Area      L = List files      G = Say Goodbye      S = Your Stats.
M = Main Menu
```

```
Select:
```

Figure 6.

```
The FILES Section.
```

```
File area # 1 ... New uploads and programs for September
Type '?' by itself for help
```

```
A = Change Area      F = Find File        L = List files      T = Type Text file
G = Say Goodbye      U = Upload a File    D = Download File   S = Your Stats.
M = Main Menu        R = Raw directory    C = Unarc Contents
```

tered users are allowed to take files.

One point we should mention: new users (and unregistered users) are limited to 15 minutes per call, up to a total of 30 minutes per day. Registered users are given 45 minutes per call, up to a total of 60 minutes per day.

We only have two restrictions on Downloading — the first, as just mentioned, is that the Downloader must be a registered member of the Board. At the moment, registration is quite informal, but, coming up very shortly, we will be using subscription numbers for user identification as the final step of bringing the Board into line with the magazine. This will allow us easy verification of details and keeps the admin work to a min.

The second restriction is that users will only be allowed to take from the board 20 kilobytes worth of files for every 1K they give. That keeps our supply of fresh material for sharing around flowing, and ensures that there will always be new files there that might interest you.

If you're a registered user, the (unabbreviated) Files menu looks like Figure 6. If you have any questions about the items on the menu, just type ? at the Select: prompt for help. Typing A gives the File Areas (see Figure 7).

If you choose File Area 1, say, and then select L, you'll see a list of files available for download. The list (Figure 8) shows the file name, its size in bytes, and a brief description (we've only shown the first few lines).

File Area 1 is the area where any files you send will first appear; at the end of each month, they are sorted into their specific areas. This is where you should check first for any goodies. If you see something that you want, hit D for Download and the menu in Figure 9 will be presented — it shows some of the most common communications protocols used for transferring files from one computer to another. (If you haven't got a communications program, see our October issue — they were covered extensively.) After you've selected one, you'll be asked for the name of the file you want; the Board responds with the message in Figure 10 which shows the file size and the estimated time for sending with the protocol (method) you nominated — note the variation. In this case, it's also figured out that Fred doesn't have enough time left to complete the transfer, so it automatically returns to the File area menu.

Figure 7.

```
File Areas -----
1 ... New uploads and programs for September
2 ... Tutorials and general help files
3 ... Catalog and special requests area
5 ... Programs and files for Amigas
6 ... Programs and files for Apples
7 ... Programs and files for Ataris
10 ... Basic programs for various machines
11 ... Programs in C for all machines
12 ... dBase II and dBase III+ programs
13 ... Pascal programs (including Turbo-Pascal)
15 ... DOS system utilities for IBMs
16 ... Benchmark programs to test PCs
17 ... Communications programs for IBMs
18 ... Fun and Games for IBMs
19 ... Word processors and text editors
20 ... CP/M based programs (including concurrent CP/M)
```

Figure 8.

```
- uploaded 27/9/87:
DSZKIT.ARC      1100 Interface Zmodem with Telix
DSZ0802.ARC    47504 A Zmodem protocol comms program
EGAWOW.ARC     70784 A great EGA demo program
MONDAY.ARC     47488 Good appointments keeping program
MSF77_CV.ARC   231739 Microsoft Fortran demo with Codeview
ORCAD.ARC      215356 Excellent CAD program demo
```

If there were enough time, the Board would say it was ready to send, and wait till your computer was ready to receive. With Xmodem, for example, you then type in **Xmodem r Egawow.arc**, hit Return, and watch.

Once the transfer is complete, you're ready to say Goodbye with G Figure 11.

Figure 9.

```
Select a method.
Z)modem
X)modem
Y)modem
M)odem7
S)sealink
Q)QUIT      (cancel the transfer)
```

Figure 10.

```
Select: x
What do you want to receive? egawow.arc

File: Egawow.arc
Size: 70784 bytes (554 xmodem blocks)
Time: xmodem=9:49 xmodem/telink=13:05 sealink=11:46

You don't have enough time.
```

Figure 11.

```
Select: G
Disconnect [Y,n,?=help]? Y

Leave a note to Andy Farkas [y,N,?=help]? Y
This will be a message to Andy Farkas

Private [y,N,?=help]?

To: Andy Farkas
Subject: Board
1: Gee - You've done a great job, Andy. Keep it up!
2:
3:

Editor Options: Type '?' by itself for help
S = Save message C = Cancel message L = List all lines E = Edit a line
I = Insert line D = Delete a line R = Resume entry J = Change Subject

Select: s
Saving your message (#109)...

You have been connected to Your Computer's Bulletin Board for 2 minutes.

This has been the 1747th call to the system.

The time is now ..... 10:29:41 22 Oct Sep 87

This has been your ... 2nd call.

Bye Fred Fredson, thanks for calling. Please hang up now.
```

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Part 2

COMING TO GRIPS WITH

NETWORKING

In Part 1, Stewart Fist explained how networking encompasses almost all of 'computer communications.' Here, he continues with Local Area Networks . . .

LOCAL AREA Networks (LANs) are not new; they've been around, albeit in primitive form, since the mid 1970s when their main purpose was to link central processing units to expensive hard disk drives and printers. In the '70s, the costs of computer processing were plummeting, but the price of peripherals remained high. You could buy a complete computer for less than the price of a printer, so LANs were introduced as a method of cost saving.

Corvus Systems was the first in the microcomputer LANs market with its Omninet, designed primarily to allow microcomputers to share one of Corvus's hard

disk drives. At the time, it was *the* major manufacturer of hard disks and therefore had a vested interest in getting these multi-thousand dollar items linked to microcomputers.

Corvus is still around with Omninet — mainly in the educational and small-business area — and has a very large installed base of LANs systems, together with a rather unenviable reputation for unreliability. But Corvus are still improving their system by widening the range of computers that can link in, and the operating systems they can handle, and designing new bridges to mainframes and to other networks.

There are dozens of other small LAN systems that over the years have built up a loyal band of followers — and an equal number of highly vocal critics. There's ArcNet, IANET, Fox 10-Net, Sytek, DR-Net and PC-Net II, to name but a few.

Ethernet

But today, the term LANs very largely equates with Ethernet. If there is such a thing as an industry-wide standard in networking, Ethernet is it (although the IBM Token Ring system is starting to give Ethernet a run for its money).

Ethernet was developed by Robert Met-

calfe at Xerox. Metcalfe went on to found 3Com, a company which now specialises in highly standardised Ethernet network systems. Xerox joined together with Digital (DEC) and Intel, the chip-maker, to force Ethernet on the industry as a standard — and much to the surprise of everyone, they have largely succeeded.

The reasons seem to be that Ethernet proved to be moderately fast, quite reliable, very flexible and capable of taking on new roles. To top this praise off, Ethernet seems to now be implementable on a wide range of different media — although it was designed specifically for coaxial cable connection.

*If there is such a thing as
an industry-wide
standard in networking,
Ethernet is it . . .*

It was originally specified as a 10 megabits/second baseband bus system and this remains the basic world-wide standard, although there is a star-topology version of Ethernet around. Ethernet systems have been implemented on everything from twisted-wire pairs to optical fibre and over both microwave and infrared aerial links. Some systems even incorporate Ethernet as a channel in broadband networks where it happily co-exists with the normal broadband LANs.

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Recently, a French firm has managed to double the capacity of Ethernet while still retaining the 10 megabits/second standard, and it also claims to have introduced a voice along with the data-stream — something that was only thought possible using broadband techniques.

So it came to pass that in August 1983, the IEEE announced the 802.3 standard with specifications close enough to those of Ethernet to constitute a tacit endorsement of its physical and control protocols.

CSMA/CD

Ethernet uses a Carrier Sense, Multiple Access/Collision Detection (CSMA/CD) control protocol which is derived from a system called Aloha, developed — you might have guessed — at the University of Hawaii. I quickly described the Ethernet CSMA/CD collision avoidance system in Part 1 when discussing AppleTalk, but it is well worth looking at in more depth.

This is a first-come, first-served protocol which works fine up to about 80 per cent of the maximum theoretical capacity of a system; above this, the system gets bogged down. When too many computers attempt to access the common cable at the same time, the whole system starts spending too much time contesting who owns the communications path.

From the time that it was released in 1979/80, Ethernet was involved in a public brawl with the International Standards Organisation (ISO). Ethernet didn't conform to the organisation's Open Systems Interface (OSI) seven-layer connection standard and for a while it appeared that Ethernet was doomed.

It is a measure of the quality of the original design that the American Institute of Electrical and Electronic Engineers (IEEE) came to its rescue by setting a committee which had the job of devising specific standards for LANs intercon-

tion which allowed for Ethernet's CSMA/CD implementation.

At about the same time the European Computer Manufacturer's Association adopted Ethernet as its LAN standard and a number of major mainframe computer manufacturers in the USA followed suit. So it came to pass that in August 1983, the IEEE announced the 802.3 standard with specifications close enough to those of Ethernet to constitute a tacit endorsement of its physical and control protocols.

Since that time Xerox and its partners have further defined Ethernet for most of the other ISO levels — although the US Department of Defence has managed to independently define its own conflicting standards for levels three and four.

Basically it works as follows — when a node wishes to send a message over the network, it first listens on the LAN for activity and if the network is silent it begins transmitting. However, if it finds that the network is busy, it will wait — constantly listening for the conversation to end. When it does, the waiting node will immediately try to seize control and transmit its message.

Most data collisions occur at this point because 2 or more nodes might be waiting and will all try to transmit at the same time. This results in a jumble of data, none of which makes sense to anybody listening and since each Ethernet controller also has a receiver that simultaneously monitors all communications on the line, the controller will immediately detect the overlapping pulses caused by the collision and stop transmitting.

All competing nodes will react the same and all will immediately transmit an abort pattern over the LANs informing everyone on the network that a collision has occurred and therefore that the last stream of data was garbled. The receiving station/s immediately dump their registers of data received and the whole network goes into a holding pattern.

Each node waiting to transmit then loads itself with a random number that it uses to represent a time period — and it waits this amount of random time before it begins to retransmit. The first node to time-out therefore has a high chance of finding the network free, and once it begins to transmit the whole wait-cycle for the other nodes begins again.

This process of network contention works very well in Ethernet for up to a 1000 or so nodes in normal circumstances but obviously the greater the number of nodes sharing the network, the greater the chance of collisions.

The information in an Ethernet network is transmitted and received in packets, each of which is called a 'frame'. These frames consist of: a Preamble, two address fields, a Type field, the Data field and a frame check sequence, in that order — refer to Figure 1.

ETHERNET PACKET

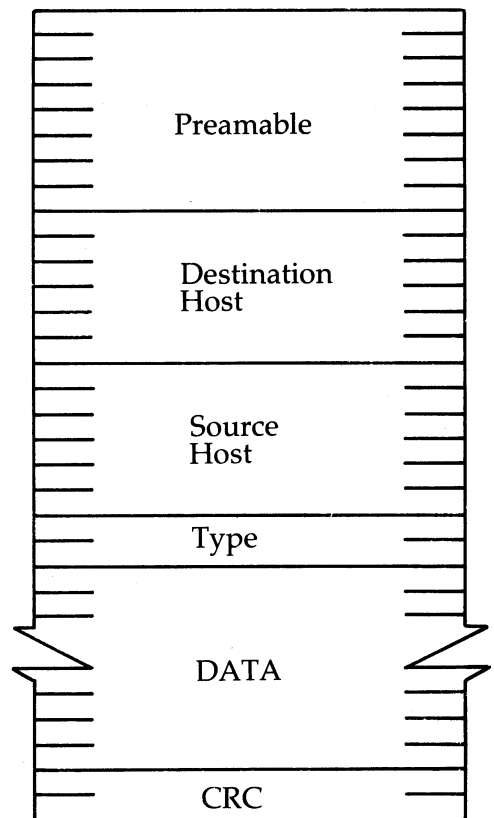


Figure 1. The information in an Ethernet network is transmitted and received in Packets, each of which is called a 'frame'. These frames consist of: a 64-bit opening statement, the Preamble; a 6-byte Destination address; a 6-byte Origination address; a 2-byte Type field that defines the user protocol associated with the frame; a Data field, which must be longer than 45 bytes and shorter than 1500; and a frame Check sequence, which ensures the data received is the same as that sent.

The Preamble is a 64-bit opening statement that synchronises the receiver and the transmitter and generally advises everyone on the network that data is on its way. It consists of 62 alternating ones and zeros, followed by an end-mark pair of ones.

The Destination address follows immediately after and it consists of a 6-byte

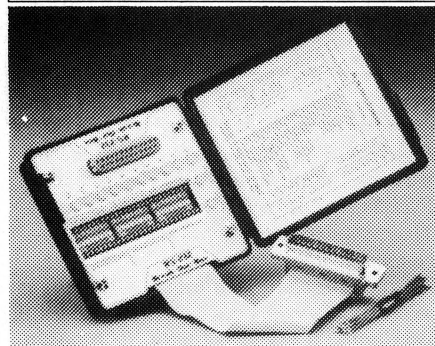
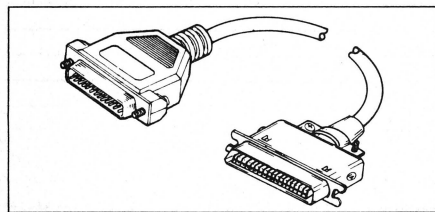
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number representing 1 of 3 types of address designations. This can be a specific address for a particular node; a general address for a group of nodes; or a broadcast address for all nodes on the network.

The second 6-byte address field contains the address of the Origination station. This is followed by a 2-byte Type field directive which identifies the user protocol associated with the frame.

The actual message is contained in the Data field, which has no fixed length. However, it does have limitations — it must be longer than 45 bytes and shorter than 1500 bytes and is automatically adjusted to accommodate the information being transmitted.

Ethernet also specifies an error-checking algorithm that calculates a sum of all the fields (except the Preamble). This result is stored in the frame check sequence field at the end of the frame. The receiving node makes the same calculations and compares its result with the frame check sequence number. If the 2 match, the system accepts that the data is valid.

The use of frames having a limited length prevents 1 node from hogging the whole system; the other nodes have an equal chance to transmit in the gap between. On the other hand, Ethernet's ability to use quite long frame-lengths, means that the system doesn't lose too much time in system overheads (addressing, checking and so on). There is also less chance of data collision as the system comes under load.

At the 'plumbing' level, Ethernet generally uses only 2 types of coaxial cable (thin and thick, or cheap and expensive — whichever way you want to look at it!).

The length of the cable is precisely stated as being a maximum of 2.8 kilometers in the Xerox standard and having no more than 1024 devices connected. But nowadays it is quite easy to link LANs to LANs and to extend the Ethernet system in distance, and in user numbers, through the use of bridges to other LANs through optical fibre, microwave transmission systems and infrared beams.

Coaxial cable isn't the only medium but it is the one defined by the Xerox and IEEE standards, and the one most commonly used. Ethernet's cable is marked every few feet at regular points; only at these points can nodes be added and removed from the system without breaking the major connecting cables.

In establishing a new node on-line, the output from the 'tap' at the mark on the cable, is fed to an Ethernet transceiver and on to an Ethernet controller — both

of which are, again, tightly defined by the standard. Each node has its own controller which contains all the instructions necessary for correct framing and network control. They've now got all this equipment down to a three-chip VLSI set, which has bought the cost of the interface down to around the \$100 mark.

Xerox has always seen Ethernet as an office automation network, primarily used to link powerful workstations, based on Mac-like Smalltalk and Interlisp-D environments to DEC minicomputers. DEC has recently taken the lead in pushing Ethernet as a viable alternative to the new Manufacturing Automation Protocol (MAP) systems that General Motors has been attempting to introduce and standardise in the USA for large-scale manufacturing enterprises.

They've now got all this equipment down to a three-chip VLSI set, which has bought the cost of the interface down to around the \$100 mark.

The problem with Ethernet in a manufacturing environment is that it can be subject to electronic interference when it passes large electrical and electronic machines. It is often too slow for some assembly line processes and the contention-type control mechanism means that timing delays in the system are uncontrollable and unpredictable. They say that Ethernet might not be able to react to a problem on the assembly line in the fraction of a second available before damage occurs — that's the opinion of the promoters of MAP, anyway.

On the other side of the coin, Ethernet is already well-established as a good, reliable LAN standard that is widely accepted around the world. It is predictable in terms of its reliability, offers no surprises and is cheap and easy to implement. Xerox and DEC point out that it will do 99 per cent of anything required of it at the present time and it gets better every day.

In the final analysis, this really is a computerised version of the story about the Old Bull and the Young Bull. My betting is Ethernet, the Old Bull — it takes its time but does the job thoroughly. □



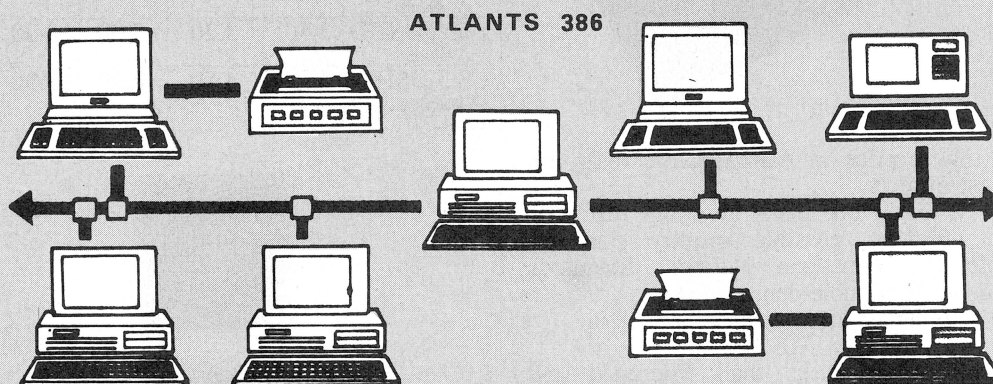
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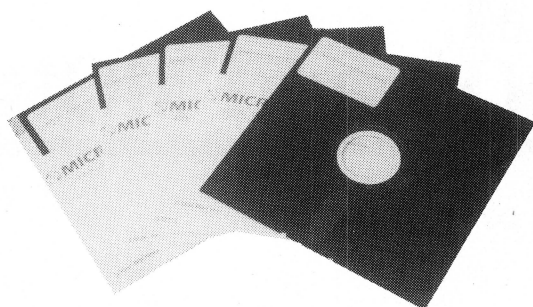
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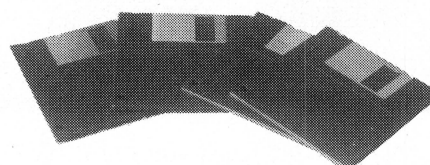
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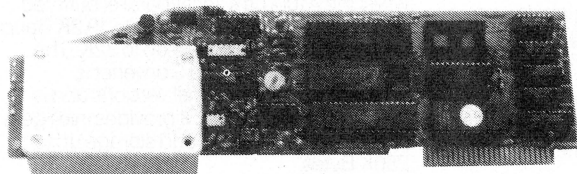


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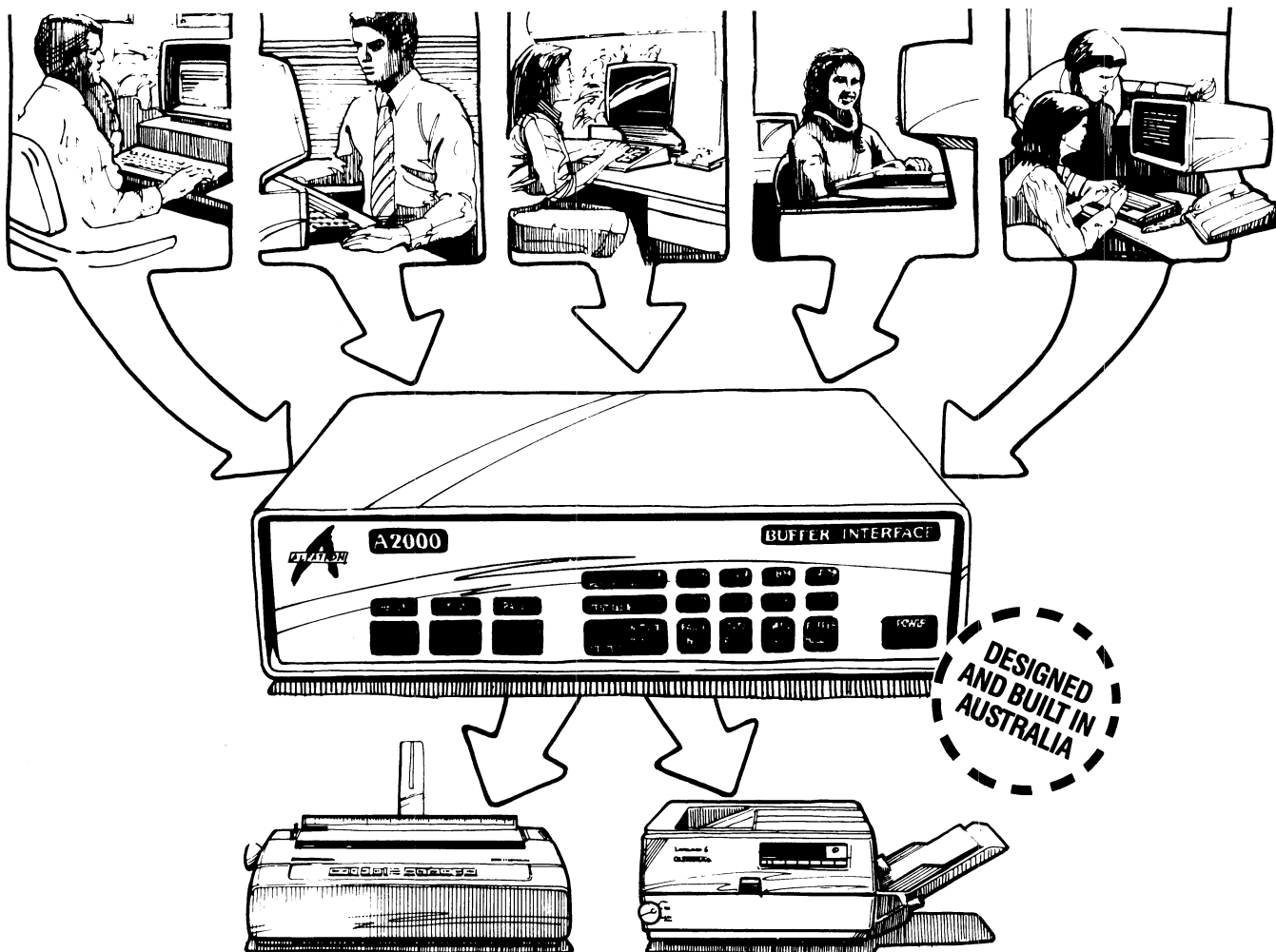
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The Attainment of Assembly

Or How You Can Program Yourself - Part 2

In Part 1, John Summerfield explained why you should (or shouldn't!) program in Assembly language. Now, we're ready to look at the structure of the 8086 (as viewed by the programmer).

A HARDWARE person's view of the 8086 chips is, of course, very different from the programmer's. The hardware-er is concerned with the use of all the wires sticking out the sides and such like. If you have a look at the 8086 and the 8088, they look the same, except for the labels. They aren't, though, and if you put one into a circuit designed for the other, you could expect a disaster. To us programmers they are exactly the same.

There is quite an amount of detail which we need to cover before we can write any programs at all, without hiding a great amount of what goes on. We'll have a look at the architecture of the 8086 first, to see what we can use in writing our programs. Then we'll have a look at a short program and discuss how it works.

The 8086 was designed by Intel and we will use Intel's names for the registers. NEC uses some different names in its documentation for the V20 and V30 microprocessors — they're shown in the tables that follow but I won't use them otherwise.

The 8086 has fourteen 16-bit registers. There are 4 'general purpose' 16-bit registers. I put general-purpose in quotes be-

cause, although they are generally interchangeable, there are some cases when the use of 1 or 2 of them is implied by the particular instruction; we will cover those cases when they arise. These 4 registers can also be used as eight 8-bit registers. Table 1 shows the relationship.

The register AX (called AW by NEC) can be regarded as two 8-bit registers, AH (AO_High) and AL (AO_Low). It is quite possible to mix instructions using 16-bit registers and 8-bit registers any way you like.

These registers are commonly used for arithmetic: addition, subtraction, multiplication and division.

There is another group of four 16-bit registers you will manipulate quite regularly. They are called POINTER and INDEX registers, and are used for addressing, or pointing to data. These are in Table 2.

There are also 4 SEGMENT registers. We will cover them in more detail later, but Table 3 shows them. Also, there are 2 miscellaneous registers, shown in Table 4.

We will now have a quick look at how

INTEL			NEC		
16-bit	8-bit		16-bit	8-bit	
AX	AH	AL	AW	AH	AL
BX	BH	BL	BW	BH	BL
CX	CH	CL	CW	CH	CL
DX	DH	DL	DW	DH	DL

Table 1. The 8086's 8- and 16-bit registers, showing both the Intel and NEC designation.

INTEL	NEC	Name	Special Use
SP	SP	Stack Pointer	Maintains stack position
BP	BP	Base Pointer	Pointer to required data on the stack.
SI	IX	Source Index	Points to source when moving strings of data
DI	IY	Destination Index	Points to destination when moving strings of data.

Table 2. The 8086's POINTER and INDEX registers.

INTEL	NEC	Name	Special Use
CS	PS	Code (Program) Segment	Points to your program
SS	SS	Stack segment	Points to the stack
DS	DS0	Data Segment	Points to some of your data
DS	DS1	Extra Data Segment	Points to some more of your data

Table 3. The 8086's SEGMENT registers.

IP	Instruction Pointer	Points to the NEXT instruction to be executed.
FLAGS	Flags register	Reflects the status of the CPU.

Table 4. The 8086's miscellaneous registers.

the 8086 addresses its main storage. I use the term 'main storage' to describe both RAM (read-write memory) and ROM (read only memory). Main storage is addressed as an array of bytes, numbered in the range 0 through $2^{20}-1$, or 1,048,575. This is a consequence of the fact that the 8086 uses 20 address lines to address the memory. However, 8086 addresses are not quite that simple.

Please note that when I talk about storage addresses, I will use hexadecimal numbers. Thus 1234 will mean X'1234', 1234h, \$1234 or '1234'b4, however you like to write it.

All main storage is addressed initially in units of 16 bytes called *paragraphs*. All addresses are calculated by adding a number to one of the segment registers. These segment registers contain paragraph addresses, and are subject to program control. All segments are 64 kilobytes (or 65,536 bytes) long and a segment points to the lowest paragraph of the segment. Thus, if DS contains 4A00, it defines a segment of storage from 4A000 to 59FFF.

The address held in a segment address is called a BASE ADDRESS. Another number, called an OFFSET address, or just OFFSET, is added to the base address to form a 20-bit storage address.

We'll have a look at the architecture of the 8086 first, to see what we can use in writing our programs. Then we'll have a look at a short program, and discuss how it works.

The segment registers can be set to any of 65536 values (they are 16 bits, remember) under program control, to allow any of the 1,048,576 storage locations to be addressed as program code, data or stack. Any area of main memory may be used for any purpose, and if desired, 2 or more segment registers can be set to the same value so the same segment of memory can code any combination of code, data and stack.

Note that all PCs have this main storage divided up into separate areas for special purposes: the IBM PC has addresses 00000-9FFFF dedicated to use for RAM (al-

though not all of it need be installed), CC000-FFFF for various ROMs including the ROM BIOS and ROM BASIC while other space in-between is used for screen displays, hard disk interface, or reserved for future use.

During program execution, the 8086 addresses program code by adding the value of the Instruction Pointer (IP register) to the code segment register. During execution of the instruction, IP is updated to point to the next instruction. Remember that CS and IP address different units of storage. If we were going to add 457 cents to 35 dollars, we could write it down like this:

35
457

We align the units column in the dollars amount over the hundreds of cents. We might then add zeros so both amounts are in cents and it would appear like this:

3500
457

We would then go ahead and do the addition and recognise that the answer is in cents.

The 8086 works in much the same way in calculating addresses. Assume that our program code is located in the segment starting at paragraph address 7E7A. Our program is about to execute an instruction at offset 1234 within the code segment. The storage address is calculated by adding 7E7A0 to 01234. The instruction bytes starting at location 7F9D4 are fetched, IP is updated to point to the next instruction, and the one just fetched is executed.

We refer to the 2 parts of the address as the base (7E7A) and offset (1234). Another way of writing the same address is 7FD4:0004 — the base is 7FD4 and the offset is 0004. This form of the address is called 'normalised' and we will use it if we need to address elements of a table which may exceed 64 Kbyte.

Data and stack addresses are calculated in the same way but there may be more numbers to add. For the moment we will assume that all data is in the data segment.

Data addresses are calculate by adding one or more of the following:

- a) The number contained in a segment register, normally DS.
- b) A number contained in the instruction.
- c) The number contained in one of the registers BX or BP.

d) The number contained in one of the registers SI or DI.

A word of warning: If register BP is used in the calculation of an address, the address is assumed to be in the stack segment. Otherwise, the address is assumed to be in the data segment.

There are some special cases. Some instructions imply the use of one or more particular registers for addressing storage locations. We will cover such exceptions when we deal with the particular instructions.

Our first program will be one to read characters from the keyboard and display them on the console.

It's about time we wrote our first program. Rather than introduce you to a catalog of instructions, we'll use a few and discuss exactly what they do in our program. Our first program will be one to read characters from the keyboard and display them on the console. We won't do anything special with the characters this month: we will leave that for next time.

Before we look at the listing, some rules about coding Assembly language programs for MASM:

- 1) You can use any alphabetic character, digits 0-9 and the special characters ?, @, _ (underscore) and \$ to label data items, instructions and so on. Don't use the digits to start data names. Uppercase and lowercase are considered equal: the label ProcessNewRecord is the same as processnewrecord.
- 2) Datanames can be any length you like: only the first 31 are significant.
- 3) By convention, we code labels in column 1. MASM does not require it.
- 4) Instruction mnemonics, MASM's directives, register names and the like are reserved words. They can only be used for their predefined purpose, not in any other way you might wish.
- 5) Comments can be introduced on any line by coding a semicolon.
- 6) Blank lines are permitted.
- 7) Instruction labels are followed by a colon: labels on directives which explicitly define storage, segments, procedures and so on are not. There are examples shown in Listing 1.

```

1      page      60,132
2      0000      fred      segment
3                      assume cs:fred,ds:fred,ss:fred,es:fred
4      0000      B4 08      again:  mov     ah,8          ;tell DOS "Read a character from the console"
5      0002      CD 21      int      21h              ;call DOS
6      0004      3C 1A      cmp      al,1ah           ;Is it an end-of-file character
7      0006      74 08      je       done             ;it is
8      0008      B4 02      mov      ah,2            ;tell DOS "write character on the console"
9      000A      8A 00      mov      dl,al          ;"this is the character to type"
10     000C      CD 21      int      21h              ;call DOS
11     000E      EB F0      jmp      again           ;go and do it again
12     0010      B8 4C00     done:  mov      ax,4c00h     ;"I have finished, and the return code is 0"
13     0013      CD 21      int      21h              ;call DOS
14                      ;DOS doesn't return
15     0015      fred      ends
16     0000      joe      segment stack
17     0000      80 [      db          128 dup(0)
18                      ]
19
20
21     0080      joe      ends
22                      end

```

Listing 1. Your first assembly language program — it reads characters from the keyboard and displays them on the monitor.

8) Numbers are normally entered in decimal. To enter hexadecimal numbers, use a leading 0 (if first digit is not 1-9) and an 'h' suffix: for example, 0ffffh or 0FFFFh or 37H.

In our source program we have two type of instruction: some which direct the assembler in its operation, called *directives* and others which relate to what we want done.

The following discussion relates to Listing 1, line by line —

1) MASM seems to think my paper is only 80 characters wide. In fact, it is somewhat wider, so I like to tell it the dimensions of my page. It is 60 lines deep, and 132 characters wide. (MASM doesn't support pages wider than that.)

2) Assembler programs are written in sections called *segments*. One segment will be addressed at run time by one or more segment registers. The segment registers will generally point to the start (lowest paragraph address) — it is possible to combine several segments into one. We are going to write a segment called *fred*. We don't say anything else about fred, so it is understood that it cannot be combined with other segments.

3) The assembler is told to *assume* that each of the segment registers CS, ES and DS will contain the base address of the segment fred when the program is running. The assembler needs to know this when it is generating addresses.

4) We are now getting into things. Remember we were going to read characters from the keyboard and write them on the console? We are going to call DOS to

read the characters and to type them. Our code will tell DOS what to do and determine when to stop.

We tell DOS what to do by putting a function number in register AH (top half of AX, remember?), supplying other information pertinent to the call and issuing the appropriate call. Function number 8 tells DOS to read a character from the keyboard and return it in register AL, the low half of AX.

The instruction MOV AH,8 tells the 8086 to put the number 8 into register AH. The section of the statement, *again:* is a label. We can issue the assembler equivalent of a *goto* to branch to this instruction. Other registers and the flags are unaffected by this instruction.

On the assembled listing, you will see the number 0000. This is the offset of the assembled instruction within the segment. Next to it is B4 08. This is the translation of the instruction we coded.

5) This is how we call DOS. Although I say *call*, INT is actually short for *interrupt*. Strictly speaking, INT is not an interrupt (DOS can't possibly be doing anything while our program is running), the 8086 processing is very similar to that which occurs for a hardware interrupt.

The exactly equivalent instruction on IBM's System/370 family of mainframes is called SVC, for Supervisor Call. This accurately describes the instruction's function.

Low storage (00000-00400) contains interrupt vectors. There is one 4-byte interrupt vector for each of the 256 interrupt numbers. Both hardware interrupts and software interrupts use the same interrupt vector table.

The interrupt number is multiplied by 4 to obtain a storage location. This storage location contains a 4 byte pointer to the interrupt service routine. For interrupt 21, the interrupt vector is at location 00084. The first 2 bytes contain the value to be loaded into the instruction pointer: the next 2 bytes contain the new CS value.

When INT 21 is executed, the following processing takes place:

- The flags are pushed on the stack.
- Interrupts are disabled.
- CS is pushed on the stack.
- CS is loaded from location 00086.
- IP is pushed on the stack.
- IP is loaded from 00084.
- The next instruction is fetched from the new location.

DOS then acts on the request and returns the character entered from the console in register AL. DOS returns by issuing an IRET (interrupt return) instruction which performs these actions:

- POPs IP from the stack.
- POPs CS from the stack.
- POPs the flags from the stack. This enables interrupts (although DOS would already have done that) and restores all the flags to the conditions that applied when the INT instruction was issued, except for one or two that DOS modifies on occasion to signal error conditions.
- Fetches the next instruction, in this case the one on line 6.

6) We now want to test the character read from the keyboard. If it is :Z (hex 1A), we assume it is the end of the file. This character is used in CP/M to signal EOF and MS-DOS often uses it in the same

way. So, we compare the contents of register AL with the value hex 1A. Internally, the 8086 performs this by subtracting 1A from the contents of AL and setting the flags. It discards the result.

7) Have a look at the object code. You will see the value 74 08. You will also see the address of the next instruction is 0008.

This instruction tests the result of the comparison, and if the two arguments were equal, IP has the value 08 added to it before the next instruction is fetched. We add the value 08 to the address of the next instruction, 0008 and calculate that, if the branch is taken, the new instruction will be at 0010.

Of course, if register AL does not contain hex 1A, no branch will be taken. Thus a conditional branch, or goto instruction is effected. You will have noted that code addressing is relative to the Instruction Pointer. This applies in other branch instructions and in call instructions.

8) You should recognise this.

9) This copies the contents register AL to DL.

10) You should recognise this.

11) The object code for this is EB F0. It would not be very useful if the 2 byte branch instructions could only jump in one direction. To allow jumps both forwards and backwards, the offset to be added is stored as a 1 byte, 2's complement number. By a little bit of calculation, we can interpret the value hex F0 as being -10 hex. Add -10 to the address of the next instruction (0010) and we have 0000. We find this is the address of the instruction labelled *again*: and pat ourselves on the back.

There is a longer form of this instruction to allow branching anywhere in the code segment. We'll cover it another time.

12) This puts the number hex 4C00 in register AX. It has exactly the same result as putting 4C in AH with one instruction, and 00 in AL with another. This is shorter, quicker and a useful comparison with some other instructions.

We are preparing for another DOS call, this time to tell DOS we have finished our work. All went well, so by convention we put 0 in AL by way of a return code. This return code can be tested in BATCH procedures with the ERRORLEVEL keyword.

13) Another DOS call. DOS doesn't return from this one.

14) This line is a comment. Comments can be on any statement, and begin with the first semicolon. Everything from the semicolon to the end of the line is ignored by the assembler.

15) This is the end of the segment called *fred*.

16) We are starting a new segment. It's called *joe* and we want DOS to use it for our stack.

When DOS starts our program, SS will be pointing to the low paragraph address of *joe* and SP will be pointing to the high word address.

17) We are defining bytes (hence 'db') and we want 128 duplications of the expression following in parentheses, in this example, 128 bytes of 0. We could put a list in parentheses and the entire list would be duplicated 128 times.

18, 19, 20) The assembler telling us what it did.

21) This is the end of *joe*.

22) The end of our program. We could have coded ' *end again*', and told the assembler that the program is to start running at the instruction labelled '*again*'. In this case it was not necessary.

When you type the program in, I suggest you call it EX001.ASM. In that case, you can use these commands to assemble and link it:

```
MASM EX001;
LINK EX001;
```

The semicolon on each line tells MASM and LINK not to prompt for any more file names. If you leave the semicolon off, MASM will prompt you for OBJ, LST and CRF file names. LINK will ask for EXE, MAP and library file names.

Now, we'll have another look at how RAM is addressed. The architecture of the 8086 is a tad confusing at first (and second) sight. To illustrate it, we will use a clean sheet of paper. It represents all the 1,048,576 bytes of main storage the 8086 can address. Draw on the page 4 boxes. You may overlap them if you want. Label each box with one of the values CS, DS, ES and SS.

These boxes each represent 65,536 bytes of storage. They are the only locations able to be addressed by the 8086. You should view them as windows through which the 8086 views its program and data storage. In 8086 jargon, these windows are called segments.

To address storage locations outside the windows, the segment registers must have different values stored in them. This has the effect of moving the windows around the page. We will investigate the instructions necessary for this another time.

To address locations within the win-

dows, offsets coded into the instructions and register contents are used. No combination of numbers and register contents can address any storage location outside these windows.

By the way, file redirection works with this program (you Turbo Pascal lot thought Borland was giving you a lot with file redirection, didn't you?), but it might be a bit hard to stop sometimes.

DOS has 2 types of files for storing executable programs: COM files and EXE files. Programs executed from COM files have all the segment registers pointing at the same 64 Kbyte window, while those in EXE files normally have them pointing at different areas.

Well, we've covered quite a lot — We've found out about the 4 general-purpose 16-bit registers that can also be regarded as eight 8-bit registers. We know there are 2 index registers and 2 pointer registers. We know about the 4 segment registers and the instruction pointer. We have had a look at a few of the most commonly used instructions, and put them into a program that works.

Next, we'll have another look at the program and make a few changes to it. We'll have a bit of a fiddle with DEBUG, to watch our program run (well, crawl actually). Maybe we will make it print files out in hexadecimal so we can see what is in them?

In the mean time, you can get the program going: it shouldn't be too hard, even without DEBUG: after all, it works on my system.

By the way, file redirection works with this program (you Turbo Pascal lot thought Borland was giving you a lot with file redirection, didn't you?), but it might be a bit hard to stop sometimes.

You could try a few minor changes to it yourself: pull out your DOS manual and look up the DOS calls. Now, try using DOS call 1 to read a character: I did it and didn't like it. Try using DOS call 5 to write the characters. □

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19	20	21	22	23	24	25	26	27
28	29	30	31	32	33	34	35	36
37	38	39	40	41	42	43	44	45
46	47	48	49	50	51	52	53	54
55	56	57	58	59	60	61	62	63
64	65	66	67	68	69	70	71	72
73	74	75	76	77	78	79	80	81
82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99
100	59	A						

THE PROPHET SPEAKS

WELL ALMOST Christmas time again. This is the time of year when people start thinking of what presents to buy. It is also the time when System Operators start dreading the influx of the new modem users.

Don't get me wrong, I'm always happy to see new users, but the ones just after Christmas tend to be of the young variety and start using the modem almost before they have even worked out what it is. A word of warning: before you buy a modem for the younger type, please make sure that you can afford the phone bill. Each year I hear the moans starting mid-January along the lines of 'My parents got the phone bill yesterday and now I'm only allowed one call a day.'

If you giving a black squawking box to one those younger ones, then at the very least be involved enough to introduce the new comms expert to a few *local* boards that are available. Just as importantly, teach them to use the boards responsibly — Bulletin Boards offer a great deal to users and widen the horizons, but only if everyone uses them properly.

Registry Access

The spectre I had hoped would never occur happened a couple of days ago (remember I am writing this in September), an organisation requested access to the registry to do a mailing. What made it even more worrying was that the person making the request addressed it to the State co-ordinators rather than me as the National co-ordinator.

The reason for this 'backdoor' approach was that on a previous occasion when asked about access I stated quite firmly that in my opinion the registry information was for the registry use only and not a way to 'get to' Sysops with anything other than Registry business.

I will now state for all those who have not yet gotten the message, the policy of the registry to requests for access — NO ONE use the information for purposes other than day to day maintenance of the Registry without prior approval of the National co-ordinator. Further, just let me add that it would need to be something pretty extraordinary for *any* request to even receive any consideration.

The only reason we even ask for the information is to allow us to check the status of a board — for example, if we get a report that a board is down and we can't logon then we will attempt voice/mail contact to resolve the question.

PAMS Registry News

Another month and more changes, if you have trouble locating up-to-date listings from your favourite board logon to your local system that supports FidoNet and leave me a message in the National AUST-PAMS conference and we will see what we can do. All systems that are connected to FidoNet should have the listings available for you to take.

Any changes, new systems and so on, put them into the AUST-PAMS conference — that's it is the best way to get the information to me and let everyone else know as well.

Anyone who wants to send me a private message my FidoNet address is now 713/606, this is as a result of Western Sydney getting its own Net. □

ACT

*** AMENDED ***

ACT Amiga BBS (Line 1)
Sysop: Mike Hurst-Meyers
FIDOnet: [626/218]
Phone: (062) 59-1137
Baud:
V21.V22.V22bis.V23.B103.B212
Access: Reg.LVA
Computer: Commodore PC40
DOS: MS-DOS
BBSSoftware: Opus

*** AMENDED ***

ACT Amiga BBS (Line 2)
Sysop: Mike Hurst-Meyers
FIDOnet: [626/219]
Phone: (062) 59-1440
Baud: V22.V22bis.B103.B212
Access: Reg.LVA
Computer: Commodore PC40
DOS: MS-DOS
BBSSoftware: Opus

NEW SOUTH WALES

*** AMENDED ***

ABCOT
Sysop: Ben Sharif
FIDOnet: [713/304]
Phone: (047) 36-4165
Baud: V21.V22.V22bis.V23
Access: Mem.VA
Computer: IBM XT

DOS: PC-DOS
BBSSoftware: Fido

*** NEW System ***

Alcoholics Opus
Sysop: Michael Aldiholic
Phone: (02) 588-8804
Baud: V21.V22
Hours: Weekdays: 2100 — 0600;
Weekends: 24 Hours

*** AMENDED ***

Arco-Tel BBS
Sysop: Alex Sardo
FIDOnet: [713/601]
Phone: (02) 683-3956
Baud: V21.V22.V22bis.V23
Access: Mem.VA
Computer: XT Clone
DOS: DOS
BBSSoftware: Opus

*** AMENDED ***

AUGUR TBBS
Sysop: Mark James
Phone: (02) 661-4739
Baud: V21.V22.V22bis.V23
Access: Reg.VA
Computer: PC Clone
DOS: PC
BBSSoftware: TBBS 2.0m
Info: Additional line: (02) 311-3052
for V21

*** AMENDED ***

Club Mac BBS

Sysop: Jason Haines
Phone: (02) 73-1992
Baud: V21.V22.V22bis.V23
Access: Mem.LVA
Computer: Macintosh
DOS: HFS
BBSSoftware: Red Wyder
*** ONLINE ***
Contact BBS
Sysop: Peter Hall
Phone: (02) 798-6368
Baud: V21.V22.V23.B103.B212
Access: Mem.LVA

*** NEW System ***

GCS
Sysop: Mark Ivanhoe
Phone: (02) 570-9861
Baud: V21.V22
*** AMENDED ***
Idiom
Sysop: Stephen Beeby
Phone: (02) 438-4060
Baud: V21.V22.V22bis.V23
Access: Reg.VA

*** NEW System ***

Lodestone BBS
Sysop: Ian McWhirter
FIDOnet: [711/407]
Phone: (02) 456-3264
Baud: V21.V22.V22bis.B103
BBSSoftware: Opus

*** NEW System ***

Matrix BBS
Sysop: Andrew Pike
Phone: (049) 38-5057
Baud: V21
Access: Mem.Reg.LVA
BBSSoftware: KBBS
*** AMENDED ***
Microlink BBS
Sysop: Tony Callahan
Phone: (02) 477-7509
Baud: V21.V2
Access: Public
Computer: C64
BBSSoftware: BBS64
*** AMENDED ***
Prophet TBBS
Sysop: Larry Lewis
FIDOnet: [713/600]
Phone: (02) 628-5222
Baud: V21.V22.V22bis.V23
Access: Public
Computer: XT Clone
DOS: PC-DOS 3.2
BBSSoftware: TBBS 2.0m
*** AMENDED ***
Shore BBS
Sysop: David Kok
Phone: (02) 959-3936
Baud: V21
Access: Reg.VA
Hours: Weekdays: 1800 — 0730;
Weekends: 24 Hours

NATIONAL PAMS LISTING

Computer: Macintosh
DOS: HFS
BBSSoftware: Red Ryder
***** AMENDED *****
Software Tools
Sysop: Bill Bolton
FIDOnet: [711/403]
Phone: (02) 449-2618
Baud: V22bis.TrailBlazer
Access: Reg.VA
Computer: Sharp 7501 AT
DOS: PC-DOS
BBSSoftware: Opus
***** AMENDED *****
Sorcerer Users Group
Sysop: John Cepak
FIDOnet: [713/607]
Phone: (02) 626-8020
Baud: V21.V22
Access: Mem.VA
BBSSoftware: Opus
***** NEW System *****
Sorcim microS
Sysop: John Caine
FIDOnet: [711/405]
Phone: (043) 69-3658
Baud: V21.V22.V22bis.V23
Access: Reg
BBSSoftware: Opus
***** UNKNOWN *****
Sydney PC Users RIBM
***** NEW System *****
The Gild FRP BBS
Sysop: Stafford Hewitt
Phone: (047) 21-8625
Baud: V21
Access: Mem.VA
Hours: 2100 — 0800 Daily
***** ONLINE *****
Your Computer
Sysop: Andy Farkas
FIDOnet: [712/622]
Phone: (02) 669-1385
Baud: V21.V22.V22bis.V23
Access: Mem.VA
BBSSoftware: Opus
***** AMENDED *****
Zeta RTRS
Sysop: Nick Andrew
FIDOnet: [713/602]
Phone: (02) 627-4177
Baud:
V21.V22.V22bis.V23.B103.B212
Access: Mem.VA

NORTHERN TERRITORY

***** AMENDED *****
Outback RCPM
Sysop: Phil Sampson
Phone: (089) 27-7111
Baud: V21.V23
Access: Public
Computer: Bigboard II
DOS: CP/M80
BBSSoftware: Minirbbs

QUEENSLAND

***** AMENDED *****
AMPAK PBBS/RCPM
Sysop: Brian Wendt & John Bews
Phone: (07) 263-7070

Baud:
V21.V22.V22bis.V23.B103.B212
Access: Mem.Re
Computer: AMPRO
DOS: CP/M80
BBSSoftware: PBBS
Info: 147.600 Mhz VK4KJB-1 (Radio);
1200 bps Amateur Packet Radio
***** AMENDED *****
Brisbane Experimental RCPM
Phone: (07) 395-1809
Info: Now Called Rock Cave BBS
***** AMENDED *****
Brisbane MicroBee User Group
Sysop: Graham Scott
Phone: (07) 366-4833
Access: Mem.VA
Info: User Works Node 2
***** OFFLINE *****
Cynthia
***** ONLINE *****
Educational RBBS
Sysop: Andrew Waddell
Phone: (07) 266-3369
Baud: V21.V22.V22bis.V23
Access: Mem.VA
Computer: IBM XT clone
BBSSoftware: Mailbox
Info: USERWORKS Node 1
***** OFFLINE *****
Focus BBS
***** AMENDED *****
Hi-Tech CBBS
Sysop: Clyde Smith-Stubbs
Phone: (07)366-6872
Baud: V21.V22.V23
***** NEW System *****
Rock Cave BBS
Sysop: Rick Dalley
Phone: (07) 395-1809
Access: Mem.VA
Info: User Works Node 4
***** NEW System *****
Sidecar Express BBS
Sysop: Brendan Pratt
Phone: (075) 46-3252
Baud:
V21.V22.V22bis.V23.B103.B212
Access: Mem.Reg
Computer: Spectravideo
DOS: CP/M80
BBSSoftware: TurboBBS
Info: User works node 7
***** AMENDED *****
SVI-RBBS
Info: Now Called Sidecar Express
BBS
***** OFFLINE *****
The Focus BBS
***** AMENDED *****
Tommorrowland RMSD
Sysop: Dave Drummond
Phone: (07) 394-2300
Baud: V21.V22.V23

SOUTH AUSTRALIA

***** AMENDED *****
Adelaide Micro User Group BBS
Sysop: Richard Newcombe
Phone: (08) 271-2043
Baud: V21
Access: Reg.LVA
Computer: TRS-80 Model III

DOS: TRSDOS
***** AMENDED *****
Adelaide MicroBee BBS
Sysop: Ron Carson & Mark
Hammond
Phone: (08) 212-6569
Baud: V21
Access: Reg.LVA
Computer: Microbee 128K
***** AMENDED *****
Cadzw Fido
Sysop: Scott Cadzw
Phone: (08) 79-3091
Baud: V21.V23
Access: Public
Computer: Epson
DOS: MS-DOS
BBSOFTWARE: Fido
***** AMENDED *****
Multiple System BBS
Sysop: Danny Vozzo
Phone: (08) 255-5116
Baud: V21
Access: Reg.LVA
Computer: Apple //+
BBSSoftware: GBBS
***** AMENDED *****
Nexus Education Dept BBS
Phone: (08) 243-2477
Baud: V21
Access: Mem
***** AMENDED *****
Omen V
Sysop: Richard Siggs
Phone: (08) 356-7939
Baud: V21
Access: Public
Computer: System80
DOS: Newdos
***** OFFLINE *****
SA Commodore BBS
***** AMENDED *****
The IDN Board
Sysop: Dave Winfield
Phone: (08) 352-2252
Baud: V21.V22
Access: Reg.LVA
Hours: Weekdays: 1730 — 0900;
Weekends: 24 Hours

***** NEW System *****
The Olympic Board
Sysop: Greg Sanderson
FIDOnet: [680/801]
Phone: (08) 265-4232
Access: Public
Computer: XT Clone
DOS: PC-DOS 3.1
BBSSoftware: Opus

TASMANIA

***** OFFLINE *****
Hobart Users BBS
***** AMENDED *****
Tassie Bread Board System
Sysop: Ian Campbell
FIDOnet: [630/310]
Phone: (003) 26-4248
Baud: V21.V22.V22bis.V23
Access: Mem.LVA
Computer: Kaypro PC
DOS: MS-DOS 3.2
BBSSoftware: TBBS

VICTORIA

***** AMENDED *****
AmigaLink
Sysop: Bohdan Ferens
FIDOnet: [631/324]
Phone: (03) 792-3918
Baud: V21.V22.V23
***** AMENDED *****
Angler's Den
Sysop: Greg Naylor
Phone: (03) 876-4118
Baud: V21.V22.V23
Hours: Weekdays: 0900 — 2300;
Weekends: 24 Hours
BBSSoftware: Opus
***** OFFLINE *****
Basic Users Group RCPM
***** NEW System *****
Big Tedd's Fido BBS
Sysop: Big Tedd
Phone: (03) 527-4945
Baud: V21 Hours: 2100 — 0800
Daily
BBSSoftware: Fido
***** NEW System *****
Brainstorm BBS
Sysop: Rowan Stevens
FIDOnet: [631/322]
Phone: (03) 758-7086
Baud: V22
***** OFFLINE *****
Castle Mania
***** OFFLINE *****
Color C-64 BBS
***** NEW System *****
Compusoft BBS
Sysop: George Tsoukas
Phone: (03) 386-6019
Baud: V22
BBSSoftware: Opus
***** AMENDED *****
Custom Programming OPUS
Sysop: Allan Williamson
FIDOnet: [630/303]
Phone: (03) 848-3331
Baud: V21.V22.V23.B103.B212
Access: Mem.VA
Computer: PC-Clone
DOS: PC-DOS
BBSSoftware: Opus
***** OFFLINE *****
Devil's Playground
***** AMENDED *****
Down Under Software Amiga/IBM
Sysop: Greg Hudson
FIDOnet: [630/306]
Phone: (03) 429-8079
Baud: V21.V22.V22bis.V23
Access: Public
Computer: Compaq 386
DOS: PC-Dos
BBSSoftware: Opus
Info: Additional line: (03) 429-5819
***** AMENDED *****
Eastwood R/ZSYS & PBBS
Sysop: Mick Stock
FIDOnet: [630/314]
Phone: (03) 870-4623
Baud: V21.V22.V23
Access: Mem.VA
Hours: 0000 — 1000
DOS: ZR-DOS
BBSSoftware: ZCPR3

NATIONAL PAMS LISTING

*** NEW System ***
ENGBASE CBCS
Sysop: Greg Furlong
Phone: (03) 29-6336
Baud: V21.V22
BBSSoftware: Opus
 *** OFFLINE ***
Further Regions BBS
 *** UNKNOWN ***
Harbourd-64
 *** AMENDED ***
Maxitel BBS
Sysop: Mark Micallef
Phone: (03) 882-6188
Baud: V21
Access: Public
 *** AMENDED ***
Melbourne Data Exchange

Sysop: Robert Broomhead
FIDOnet: [631/321]
Phone: (03) 561-6556
Baud: V21.V22
Access: Reg.VA
 *** OFFLINE ***
Omen IV RTRS
 *** UNKNOWN ***
Osborne Australian BB
 *** AMENDED ***
PC Connection IBBS
Sysop: Lloyd Barrett
Phone: (03) 528-3750
Baud: V21.V22.V22bis.V23
 *** AMENDED ***
PC-Oasis System
Sysop: Craig Wilson
Phone: (03) 465-5257

*** NEW System ***
Prodergy
Sysop: Michael White
Phone: (03) 562-0489
Baud: V21.V22.V22bis.V23
Hours: Weekdays: 1500 — 2030;
 Weekends: 1200 — 1800
BBSSoftware: Opus
 *** OFFLINE ***
Public Resource 2
 *** AMENDED ***
Sorcerer & CPM Users RBBS
Sysop: David Woodberry
Phone: (03) 754-5081
Baud: V21.V22.V23
Access: Mem.Reg.VA
Computer: Executive 816
DOS: CP/M

BBSSoftware: Ros
 *** OFFLINE ***
Supermicros RBBS
 *** OFFLINE ***
Ten to One Amiga BBS
 *** AMENDED ***
The MACBOARD
Phone: (03) 435-9152
Baud: V21.V22.V22bis.V23
Access: Public
 *** AMENDED ***
The NATIONAL CBCS
Sysop: John Blackett-Smith
FIDOnet: [630/301]
Phone: (03) 25-6904
Access: Public
Info: FIDOnet Region 50
 Co-ordinator
 *** AMENDED ***
The Real Connection
Sysop: Carla Miller & Andrew Moore
Phone: (03) 288-0331
Access: Public

WESTERN AUSTRALIA

*** OFFLINE ***
Atari Forever
 *** AMENDED ***
Mouse Exchange BBS
Sysop: Leonard Hollings
FIDOnet: [690/902]
Phone: (09) 339-6890
Baud: V21.V23
Access: Public
 *** AMENDED ***
Nemo 3
Sysop: Graeme Platt
Phone: (09) 370-333
Baud: V21.V22.V22bis.V23
Access: Mem
 *** AMENDED ***
Nemo Games Machine
Sysop: Graeme Platt
Phone: (09) 370-2666
Baud: V21.V22.V22bis.V23
Access: Mem.LVA
 *** AMENDED ***
Nemo Multiple BBS RAPL
Sysop: Graeme Platt
Phone: (09) 370-1855
Baud: V21.V22.V22bis.V23
 *** ONLINE ***
Omen Mini BBS
Sysop: Greg Watkins
Phone: (09) 279-8555
 *** NEW System ***
Pegasus BBS
Sysop: Michael Russell
Phone: (09) 242-1515
Baud: V21.V22.V22bis.V23
Access: Public
Hours: Weekdays: 1700 — 0900;
 Weekends: 24 Hours
Computer: Epson AX
DOS: MS-DOS
BBSSoftware: Opus
 *** AMENDED ***
WA Atari BBS
Sysop: Graham Basden
Phone: (09) 306-2134
Baud: V22
Access: Reg.LVA

Just a few notes to help with you use the PAMSLIST information -

----- Access information -----

Mem	-	Membership required for full access, cost and other details shown if available.
Reg	-	Registration required, details show if known.
VA	-	Visitor access Available to most functions.
LVA	-	Limited Visitor Access available.
Public	-	Public board, open to all.

Baud information: V21 - 300 Tx / 300 Rx CCITT
 V22 - 1200 Tx / 1200 Rx CCITT
 V22bis - 2400 Tx / 2400 Rx CCITT
 V23 - 1200 Tx / 75 Rx CCITT
 V23ORG - 75 Tx / 1200 Rx CCITT V23 set to originate
 B103 - 300 Tx / 300 Rx Bell (US)
 B212 - 1200 Tx / 1200 Rx Bell (US)

Unless otherwise shown all systems are 8 bit bytes, 1 stop bit, no parity V21

Bulletin Board Information

Type: New System / Change

System Name: _____

Short Name (11 character Max): _____ Operating System: _____

Board Telephone number: (____) _____

Online Sysop Name: _____

Machine: _____ Operating System: _____

BBS Software: _____

Hours of operation: 24hours / _____

Modem Type: _____ [V21/23 etc]

User Access: Member / Registered User / Public / Visitor / Limited Visitor
 [Delete as required]

Other _____

Online _____

Info _____

Fido Address: [_____/_____] _____

Confidential Information

Sysop Name: _____

Telephone number BH: (____) _____ AH: (____) _____

Address: _____

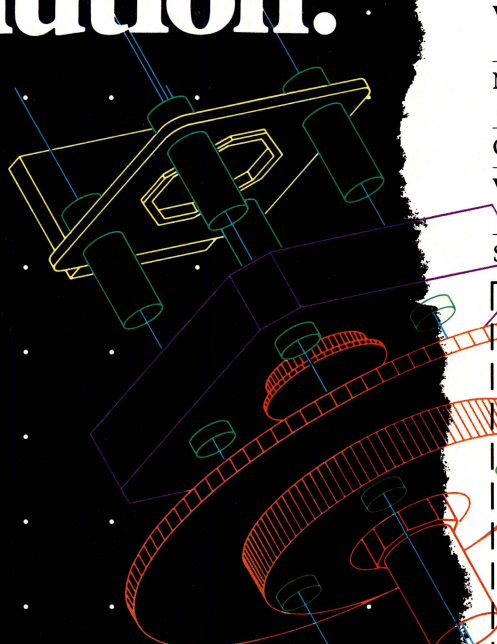
 _____ Postcode: _____

Please forward changes or new listings to: Australian PAMS Co-ordinator
 Prophet Bulletin Board
 PO Box E41
 Emerton NSW 2770

Electronic address: BBS (02) 628-7030
 Fido [/]

Don't settle for half a PC CAD package.

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Other 'total' packages add up to only part of the PC CAD story. You could end up with a sorry combination of 3 or more brands, leaving you in real difficulties when it comes to support.

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And consider the financial benefits. HP PC CAD will boost your productivity up to 4 times, and that means greater profit. HP's 3 year on-site hardware support plan solves any problem on the spot, saving you destructive downtime. It delivers the lowest cost of ownership over 3 years in the market today. You've the overall excellence of HP technology and more than comparative specifications. Plus the flexibility to provide finance that being the biggest name in PC CAD can bring.

The Final Proof.

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- ECS (03) 209 9135

NSW - Metropolitan Business Machines (02) 267 1611

- ECS (02) 958 9414

QLD - Applied Microsystems (07) 846 1001

WA - Pro-link (09) 367 7822

- PHM (09) 444 0233

SA - ASSCO (08) 232 1333

YES, I want the total PC CAD solution, please send me your information package.

Mail this coupon (no postage stamp required) or write to:
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31-41 Joseph Street, Blackburn 3130.

Mr/Mrs/Miss/Ms.

Initials

Surname

Title

Company

Business Address

Postcode

Phone



HEWLETT
PACKARD

We never stop asking What if...

NEW PRODUCTS

Software

Chart Version 3.0

Microsoft

Phone: (02) 452 5088

Price: See Below

The latest version of Chart, Version 3.0, has been released. Chart 3.0 runs on IBM PCs and compatibles and the IBM Personal System/2 series. It features extensive image control and support for output devices, providing high quality output for data and text charts. Chart 3.0 has an expanded set of data analysis tools and new mouse support. The gallery of 8 chart types and 48 predesigned formats has been expanded and now includes new 3 dimensional effects for bar, column, line and pie charts. Text charting functions such as text alignment, line spacing, text rotation, bullet symbols and line drawing have also been added. The statistical functions have also been expanded to provide even more data analysis capabilities.

The new program accommodates up to 8000 data points per series and up to 32,000 per chart. Chart 3.0 costs \$695, though registered users of earlier versions can upgrade for \$175. Version 3.0 is available for a 5 node network for \$2085. Licences for additional nodes are \$417 (prices quoted are untaxed).

PC-Mos

SPS

Phone: (02) 419 5366

Price: See Below

A new version of the PC-Mos operating system from Software Link which adds support for 8088, 8086 and 80286 based PCs. PC-MOS/386 Version 1.02, is now available. The product is distributed in Australia by SPS. PC-MOS/386, released earlier this year, is claimed by SPS to be the first available operating system to take advantage of the 80386 CPU's memory management and processing capabilities in native mode. The new version also adds support for 3 1/2 inch disks. PC-MOS supports multiple users or tasks, each with up to 640 kilobytes of RAM as well as fea-

tures such as file sharing, user security, print spooling, disk caching, a full screen editor and on-line help.

Those features of PC-MOS/386 that are specific to the 80386 CPU, like support for 32-bit native mode applications, are now isolated in a simple system driver file, \$386.SYS. Systems using other CPUs would not invoke this driver, thereby saving the memory overhead of its additional code. There are 3 new system drivers that support specific memory management memory management hardware add-ons available for non-80386 systems. PC-MOS/386 Version 1.02 is available on 5 1/4 and 3 1/2 inch disks. The single user version is priced at \$400, the five user version at \$1152 and the 25 user version at \$1992 (all prices untaxed). According to SPS, all current registered users of PC-Mos/386 will be upgraded to the new Version 1.02 free of charge.

Intuit — Oops

In Rose Vine's review of Intuit ('Intergration For A Song') in our September issue, we said all the right things but got the Post Office of the distributor wrong — the correct address is: Noumenon Pty Ltd, PO Box 280, Carlingford 2118 NSW; (02) 871 7170. Our apologies to those of you who tried to contact them with the incorrect box number (and to the holder of the box quoted). If you've written to them and not yet received a reply, that could be the reason, so please follow it up by phone. In case you missed the review, Rose summed the product up so — 'If you are an enlightened business person with limited processing needs, or you're one of the more humble computer users with limited financial resources, Intuit offers you incredibly good value.'

Project 4.0

Microsoft

Phone: (02) 452 5088

Price: See below

Microsoft has announced a major update to its project management package, Project. Version 4.0, which has been enhanced with plotter support, custom reports, resource levelling, new activity relationships, data filtering and a variety of other features. Project Version 4.0 now supports the full line of Hewlett-Packard plotters and all paper sizes from A to E. It also features custom reports that gives users complete control over format and content. The suggested retail price is \$775 untaxed; registered users of earlier versions can upgrade to Version 4.0 for \$175.



dBase Mac

Ashton Tate

Phone: (02) 868 3600

Price: \$995 taxed

A relational database management system for the Apple Macintosh range, dBase Mac, is now available. The product features ease of learning through an extended implementation of the Macintosh graphic user interface. A non-procedural product design offers power without programming that enables users to perform entry, manipulation and retrieval of data as well as tasks such as creating relationships between data files and generating custom multi-file reports without the need to learn programming. Applications development power is available through a full featured procedural (advanced programming) language. Users can directly access .DBF files from the IBM compatible dBase family of database products.

Alias/1

TCG

Phone: (02) 699 8300

Price: \$110 untaxed

Alias/1, a potential 3 dimensional image simulator, sketch pad, illustration studio and

model shop all contained within a fast, flexible package has been released by TCG. It is designed to meet the needs of designers and combines 3D geometry, powerful image, computing and Alias/I software all interfaced to Cad/cam. The package was created for people who trained as visual designers. Alias/I produces a wire frame environment visually based on interactive Spline technology and a visual environment which allows unlimited viewing of angles and perspectives of choice. It works on hardware such as the Iris 4D/6-3D Superworkstation. Using Alias/I you can simulate mass, cover, lighting, texture, transparency, reflection and motion giving the user photo realism of the product, structure or environment created. Alias/I is intended for use by designers in the areas of conceptual, environmental, packaging and product designing.



Apple Computer Australia

Macintosh

Enhancement Products

Apple Computers Australia

Phone: (02) 888 5888

Price: See below

Apple has released new multi-tasking systems software, stackware software, a new printer and two communications products to further enhance the capabilities of the Macintosh family. Among the new products are Hypercard, described as a brand new kind of software to link PCs with video technology and ease management of large amounts of data; Multifinder, the first generation multi-tasking system for the Mac and the Apple ImageWriter LQ, a wide carriage dot matrix printer capable of near laser printer output from all Apple PCs. Communications products include AppleShare PC software to enable IBM PC or compatible equipment (using the AppleTalk PC card) to access information stored in the AppleShare file server within an AppleTalk network. For pricing and more detailed information, contact Apple directly.



Retrieve

Information Potential

Phone: (03) 670 0733

Price: \$650 taxed

A locally developed information storage and retrieval system for the IBM PC and compatibles has been released by Information Potential. Retrieve can maintain up to 65,000 database records, consisting of 90 lines of free format text and 15 lines of dates, times and comments. All words and dates are indexed, making information retrieval a fast process. Information Potential claims that the system is capable of searching 5000 records in less than 1 second.

Retrieve can take text from other files directly into its own wordprocessor. It is able to retrieve information in any number of ways. Searching is initiated using simple English commands and as the database is indexed, records can be quickly found. Flexible reporting is available for specific search criteria and reports can be sent to a monitor, printer, or a designed file that may be included in other reports. A list of important words are kept in a dictionary to warn the user that data has been accidentally entered. Retrieve has a 3 tier password system to protect the database from unauthorised users.

FOCUS

Syman

Focus Business Systems

Phone: (02) 498 4188

Price: See below

A fully integrated manufacturing and accounting system, Syman, has been released for use on IBM PCs and compatibles. Syman is available for single user PCs and up to 200 plus multi user systems. The package consists of five integrated modules: order entry, purchasing, job shop, inventory control, Focus Business software (general ledger, ac-

counts payable and receivable) and a fully integrated materials requirements planning module.

Modules can be bought individually to suit each user's specific needs. The Order Entry module organises incoming orders, tracks the status of orders and allocates inventory. Purchasing maintains detailed supplier information and analyses past performance to support greater control of a user's purchasing system. Job shop will identify, cost and track estimate jobs, planned and released jobs and capacity planning; it allows 'what if' analysis. Syman also features single key commands and on-line instructions. Pricing starts at \$8000.

Word Version 4.0

Microsoft

Phone: (02) 452 5088

Price: See below

The latest version of Word, Version 4.0, has been released by Microsoft for IBM PC and compatibles and the IBM Personal System/2 series. Word 4.0 is designed to provide specific solutions for users at all levels. Among the new features are increased speed, line and box drawing, document management and retrieval, macros and improvements to the user interface. According to Microsoft, it is up to 10 times faster than the previous version and has big speed improvements in scrolling, file load and save, cursor movement and pagination.

Word 4.0 has a new toggle switch between text and graphics modes — the user can work with the wordprocessor to enter data in text mode, then toggle to graphics mode to see the WYSIWYG display. There the text is displayed on the screen as it will appear on the printed page. The graphics mode uses hi-res graphics boards and monitors, such as the VGA graphics modes of the IBM PS/2. The new Document Management and Retrieval feature helps users to easily search for and locate documents and manage large directories. A number of new tools, including a spreadsheet link, an expanded 130,000 word spelling checker and line drawing tools are included. Word 4.0 requires a minimum 320 Kilobytes system with either 2 floppy disk drives or 1

floppy drive and 1 hard disk drive. It has a suggested retail price of \$795 untaxed, though current registered owners can upgrade to 4.0 for \$175. Users who purchased a licence for Versions 3.0 or 3.10 after 11 August, 1987 will receive the upgrade for no further cost.

FBN

Software

SmartKey and PostCode

FBN Software

Phone: (062) 85 2218

Price: See Below

New versions of the SmartKey and PostCode programs for use with Amiga software have been released by FBN Software. SmartKey allows the user to create macros by converting an unlimited number of keystrokes to a single keystroke. PostCode is an index of 12,000 Australian localities and their postcodes and allows almost instantaneous insertion of the correct postcode into letters or address lists, again with a single keystroke.

The Amiga SmartKey's super-shift acts as a skip macro command which returns the macro key to its original value without the need to undefine the macro or go through menus. The latest SmartKey version can be used with an Amiga 500, 1000 or 2000 computer in conjunction with KickStart 1.2 or later. Amiga SmartKey is not copy protected. Both SmartKey and PostCode are memory resident. The Amiga SmartKey retails for \$59.95, while the Amiga PostCode is priced at \$49.95.

Peripherals

FM Modems

Peak Pacific

Phone: (02) 437 4511

Price: See Below

Peak Pacific (formerly Pacific Data Corporation) has released two new modems that are designed to use FM radio bands instead of conventional Telecom leased lines. The first modem contains an FM transceiver inter-

face that allows users to connect to existing radio networks such as those used by police and ambulances. The other has a builtin FM transceiver that allows connection to conventional networks. Using FM band 40.45 MHz, the modems can send and receive data over distances up to 200 kilometers at speeds between 2400 and 4800 baud. The distance depends on the terrain, environment and topography of the network and the type of aerial used. According to Peak Pacific, the technology used in the products ensures 100 percent error free transmission of data. The products are claimed as being hacker and tap proof. The base price for a modem, radio, antennae and installation is \$3,000 untaxed.

Model 80

Honeywell Bull

Phone: (02) 923 9660

Price: \$6184 taxed

The Model 80 laser printer from Honeywell Bull offers 300 x 300 dots per inch resolution, 250 sheet capacity and RS 422A, RS232C and Centronics interfaces. It prints up to 8 pages a minute and provides non impact printing at a noise level of about 55 decibels. A wide variety of type styles is available; the 4 resident fonts are Courier, Prestige Elite, Century PS and Letter Gothic. Others can be downloaded from the host computer or added by inserting optional font cartridges into slots on the front of the front of the printer. Honeywell Bull software supports bold printing, automatic header and footers, underlining, strike-through printing and other features. Forms overlay make it possible to register data in the printer's memory and recall it for printing.

Mac2624

Megatec

Phone: (03) 874 3633

Price: \$355 taxed

Apple Macintoshes can now emulate an Hewlett-Packard block mode terminal while retaining the graphics capability of the Mac using the newly released Mac2624. The Mac2624 allows the Mac to communicate interac-

tively with the HP3000, providing on-line access to the data, applications and storage capacity of the HP 3000. The Mac2624 comes complete with disk and manual. It implements all the modes, parameters, keyboard features and display characteristics of an HP terminal with all the convenience and added functions of a Mac. In HP mode, the mouse can still be used to position the cursor or to click on a function key. According to Megatec, the Mac user does not need to retrain on an HP terminal.

Mac2624 also has utility features including modem control and a blending of Macintosh and HP3000 based text and raster graphics capabilities which enable full finished graphics. It will run over direct connection or via modem at baud rates from 300 to 57,600 bits per second.

All Chargecard

SPS

Phone: (02) 419 5366

Price: \$1152 untaxed

The All Chargecard is for users of

IBM PC, AT and compatible PCs; it corrects the problem of limited addressability of memory under DOS. The card provides DOS users with 960 kilobytes of addressable RAM under DOS and the ability to work with up to 16 megabytes of memory in both real and protected mode. Current DOS users are restricted to 640 Kbyte of addressable memory. The All Chargecard plugs directly into the PC motherboard. It is completely software controlled and claimed to be transparent to the user.

According to SPS, the use of the All Chargecard means that PC and AT users can now consolidate spreadsheets, enlarge databases and process larger text documents without adding additional memory. Users can run the Lotus/Intel/Microsoft Expanded Memory Specification and the Ashton-Tate Enhanced Expanded Memory Specification without getting a premature *memory full* sign. SPS claims that All Chargecard can work with existing expanded memory boards that may be in use.

Ricoh PC Laser 6000

Mitsui

Phone: (02) 451 7711

Price: \$3995 RRP

Mitsui has released a compact, easy-to-operate, 6 page per minute laser printer, the Ricoh PC Laser 6000. The new printer comes standard with a controller configured with 1 megabyte of RAM that is expandable to 2 M-byte for desktop publishing applications. The printer also comes standard with Diablo 630 emulation, ensuring that the PC Laser 6000 will operate virtually all popular software written for wordprocessing, database, spreadsheet, Cad/cam and business graphics applications. The printer also comes standard with both Centronics parallel and RS232C serial interfaces to accommodate most microcomputers. The printer supports up to 32 fonts per page from the 8 resident fonts, font cartridges or fonts downloaded from the host microcomputer. The 8 resident fonts include Courier, Prestige Elite, Letter Gothic, and

Century PS. The printer features input and output trays which each hold 150 sheets. The programmable front panel controls offer the ability to select fonts, set interface protocols, paper size and more.

SQ 555

CVA Computer Peripheral Sales

Phone: (02) 476 6400

Price: \$1820 taxed

A removable Winchester disc drive with a formatted capacity of 44.5 megabytes has been released by CVA Peripherals. The new drive is an extension of the Syquest series of drives that have been available for some time. Known as the SQ 555, the drive offers users the ability to have virtually infinite prime storage simply by changing cartridges. The 44.5 Mbyte capacity allows the SQ 555 to contend seriously for use in multi-user and networked systems. The SQ 555 features an average access time of 25mS and it fits directly into a 5 1/4 inch slot.

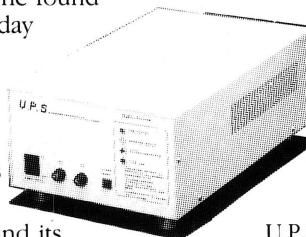
Do You Sometimes Feel Like Joe . . .



Joe's got a real problem. Last week his keyboard just hung-up on him and this morning he found that the files he was working on yesterday were somehow corrupted.

He works in a busy office, full of typewriters, photocopiers and other automated office equipment. But there's another type of noise in his office that he doesn't know about.

Joe's office is also electrically noisy and its this electrical noise in the form of power surges and spikes caused by the use of office machines that disrupts Joe's computer equipment.



So he's had enough. Joe's investing in an Uninterruptible Power Supply (U.P.S.). His friend recommended "Perfect" U.P.S.'s. Starting at \$625, they can switch-in within 4 milli-secs of the power disruption and provide up to 30 minutes of protection at full load.

For more information on Perfect U.P.S.'s and how they can save you time and money, call Emona at (02) 519 3933. Or write: Emona Computers P/L, PO Box K720, Haymarket 2000. Fax: (02) 550 1378.

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Furniture

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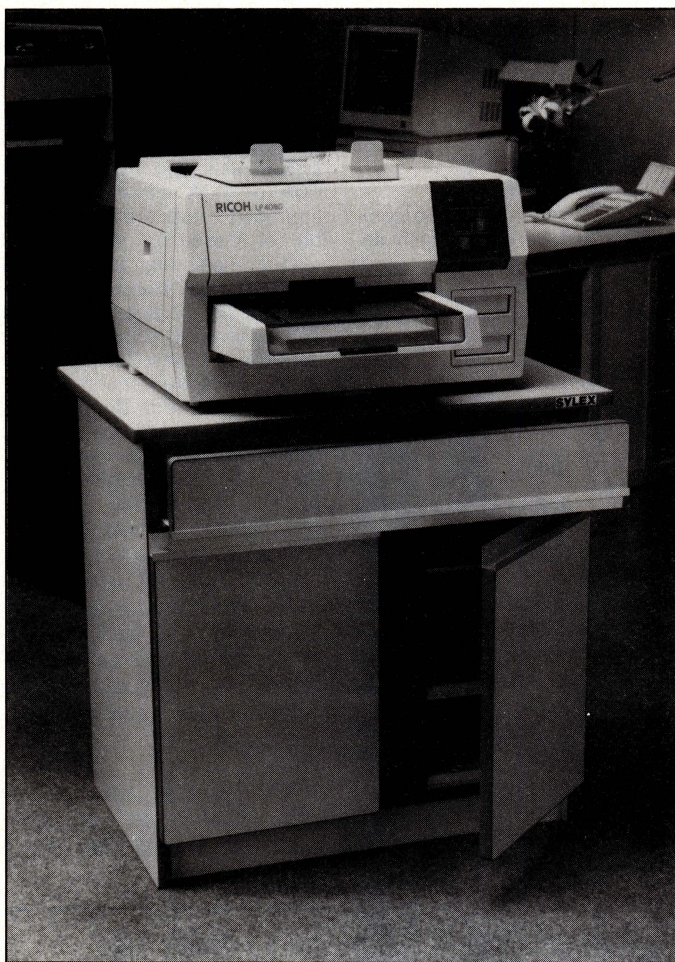
Sylex

Phone: (02) 647 2888

Price: \$425 taxed

Sylex Ergonomics has released

the Laser Printer Cabinet in response to the growing demand for laser printers. The Laser Printer Cabinet is designed to keep the printer and its consumables in an ordered, efficient format. It will accommodate all paper storage on multi-adjustable shelves, with additional space provided for ink cartridges and bulk materials. The drawer above is large enough to store instruction manuals and the fonts. The Cabinet is constructed from Florentine Grey craftwood, finished with mid grey T-mould and is designed to blend in with the decor of the modern office.



Synchrolift Chair

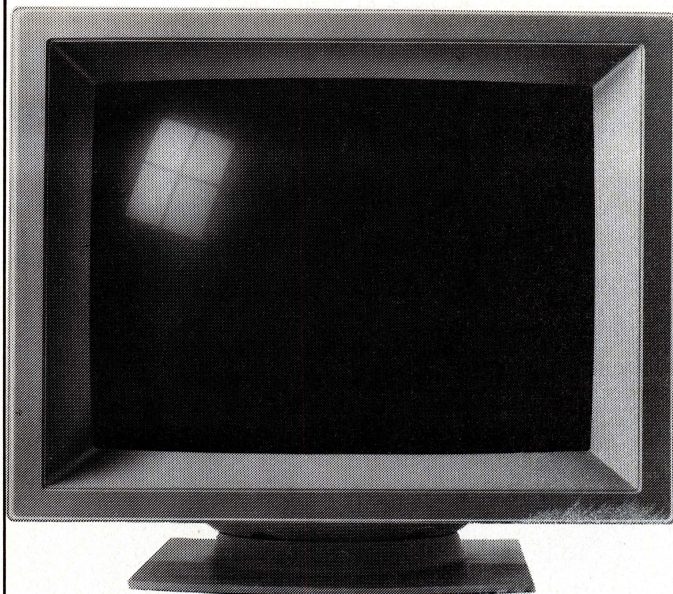
Sylex

Phone: (02) 647 2888

Price: See below

Sylex has released its latest ergonomic chair, the Synchrolift. The seat pan and backrest are height and tilt adjustable and the synchron action links together the movements of seat tilt with back-

rest tilt to ensure that they are in the correct position relative to each other. This prevents the common problem of incorrect settings. The synchron action is operated by one simple lever. Other features incorporated are a large backrest and a wedge contoured seat. Seat height adjustment is by a top activated gas lift cylinder. The chair also has a



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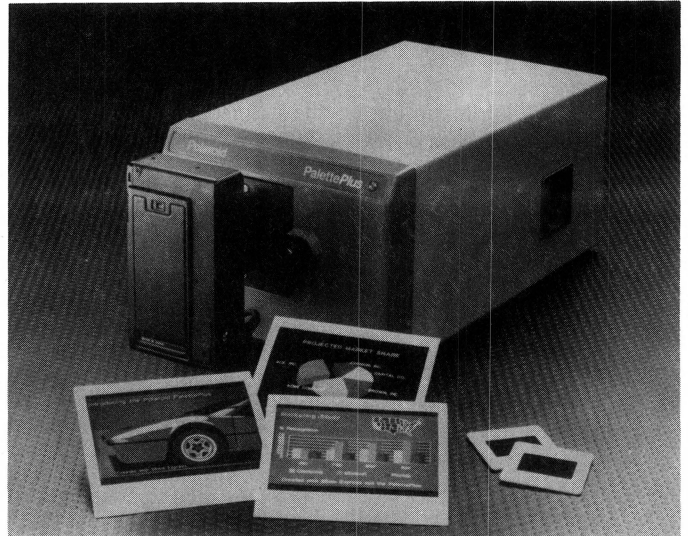
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NEW PRODUCTS



▲ scruff proof base with twin wheel castors, pure wool fabric which does not generate static and op-

tional arm rings. It is priced at \$445 (taxed) without arms and \$540 (taxed) with arms.



Miscellaneous

PalettePlus

Polaroid

Phone: (02) 887 2333

Price: \$3800 untaxed

Polaroid has introduced a computer image recorder which delivers high resolution colour prints, slides or overheads from IBM compatible PCs using EGA boards. The system, PalettePlus,

when connected to a computer with an EGA or EGA emulating board (21.85 KHz sweep) and graphics software with a PalettePlus driver can produce 640 x 700 pixel hardcopy. The system can also be used with CGA or CGA emulating board equipped computers. It is capable of producing images with resolutions as high as 920 x 700 pixels. Output resolution is dependent on the actual hardware and application software combination used. New, easier to use Polaroid Palette Version 4.0 operating software in the PalettePlus package includes a graphics adapter menu which identifies 7 EGA and 5 CGA boards compatible with the recorder. The package includes the exposure unit with connecting cables, a 3 1/4 x 4 1/4 inch film back for overhead slides and prints, an autowind 35 mm camera back, Power-Processor 35 mm slide processor, illuminated slide cutter/mounter and Palette Operating Software Version 4.0. Polaroid also distributes 35 mm Express, one of the many graphics software packages with incorporate drivers for PalettePlus.

Tandy Credit Card

Tandy

Phone: (02) 675 1222

Okay all you computer enthusiasts who like collecting plastic — here is one credit card with you in mind! Tandy Electronics has introduced the Tandy Credit Card which allows the immediate purchase of any product, covering a range of 2860 products. The card is available from 200 Tandy store locations around Australia.

BACK⁴UP

ESSENTIAL DATA DUPLICATOR

Back up your copy-protected disks with **ESSENTIAL Data Duplicator 4 PLUS** ■

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PLUS program uses a specially designed hardware card which works with your disk drives to back up disks by accurately copying the bits of data from each track. Don't be fooled... no other copy-program/system for Apples can do this! ■ In

addition to backing up disks, **EDD 4 PLUS** includes several useful utilities such as examining disk drives, certifying disks, displaying drive speed rpm's, plus more!

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and is priced at \$190.00 (duodisk/unidisk 5.25 owners must add \$32.00 for a special cable adapter). ■ A standard

EDD 4 version which doesn't include any hardware is available, and can be used on Apple IIc and III (using emulations mode) and is priced at \$125.00.

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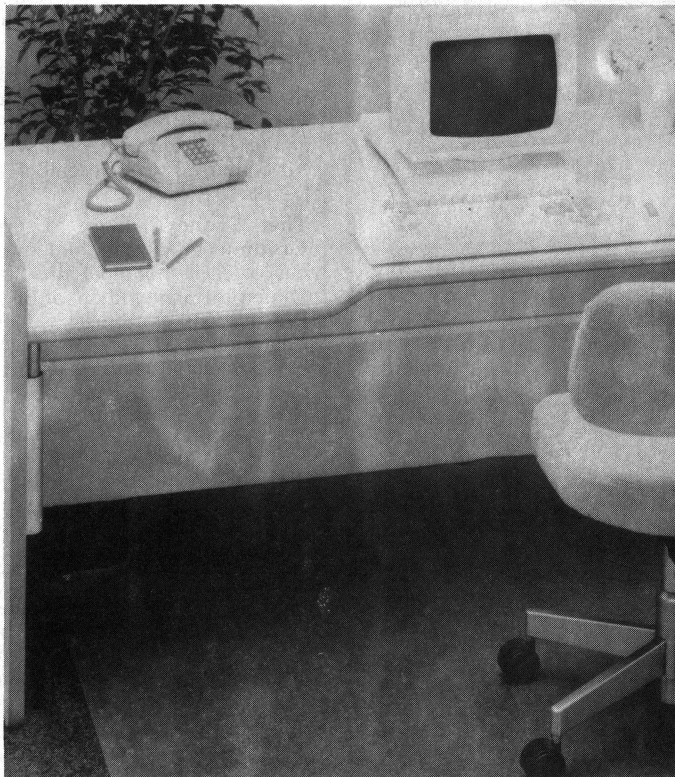
Price: See below

Olivetti Australia has reached an agreement with Peripheral Computer Industries to provide hard disk unit repairs for the Olivetti PC range.

Olivetti says it is the only PC manufacturer able to provide local hard disk repair. Other

companies usually ship units for repair to plants in overseas locations.

Repairs of hard disk units require what is known as a Class 3.5 clean room environment; this is provided by Peripheral Computer Industries. Initial batches of repairs have been checked and results have been good. People who own an Olivetti machine and would like to use this service should contact Olivetti on (02) 358 2655. Prices of repairs vary from unit to unit. Peripheral Computer Industries also repairs other brands of hard disk drives.



Anti-static Computer Mat

Sylex

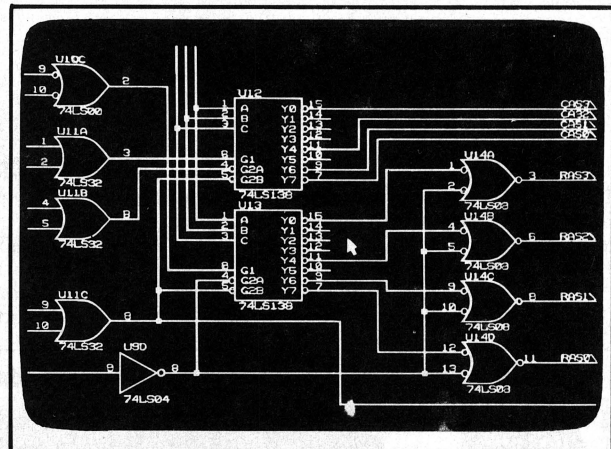
Phone: (02) 647 2888

Price: See below

Yet another piece of computer furniture from Sylex. This product is an anti-static computer mat. According to Sylex, static electricity is ever-present and builds up in the body of a VDU operator to high levels of voltage; up to 3000 volts can be unfelt by the operator but could cause memory loss and data corruption to equipment.

The mat drains data-corrupting static electricity in less than 0.3 seconds. The company claims that this is important because to be effective an anti-static mat must drain electricity almost instantaneously. The Sylex mat drains electricity through a conductivity lead with a builtin one megaohm resistor which is connected to an earthed point.

The mat is available in three sizes up to 1200mm x 1500mm. The largest size retails for around \$359. The mat is available from most major computer companies and Sylex distributors. □



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YC

Events

The Australian Urban and Regional Information Systems Association will hold its 15th Annual Conference — UPRIS 15 — in Hobart from December 2 to 4. For full details contact the

conference secretariat (002) 34 1424.

The First Australian CD-ROM Conference will be held at the University of Adelaide from November 19 to 20. Contact Robert Hayes (08) 228 5020. **Ausgraph '87** organisers are calling for previously unpub-

lished papers dealing with Cad/cam animation, scene simulation and image processing. The show will be held in Melbourne from July 4 to 8 at the Hyatt on Collins. Details (03) 387 9955.

The Standards Association of Australia is calling for comments on a proposed new stand-

ard which specifies requirements for a software quality management system. Phone (02) 963 4111, for details.

Australian Financial Review New Product & Technology Expo. At the Melbourne World Trade Centre, from November 11 to 15. Contact Fiona Waite on (02) 439 7738.

The Joint International Symposium on Information Systems is calling for papers for its meeting to be held in Sydney from February 29 to March 2 next year. Details on (02) 697 4413.

The 1987 AFR New Product Expo will be held in Melbourne from November 11 to 15. Phone (03) 266 4424.

The Australian Society for Computers in Learning in Tertiary Education is holding its annual conference in Sydney on November 30 and December 2. Details (02) 697 3175.

The Sydney dBase Users' Group meets on the third Tuesday of each month at the Bird Cameron Training Room at Bligh House, 4 Bligh Street Sydney. Contact (02) 27 8273. The number for Melbourne dBase users to contact is (03) 318 2666.

Overseas Exhibitions

Electrex, a UK electrical and electronics exhibition, will be held in Birmingham from February 29 to March 4 next year. Contact Keith Prowse (Australia) on (02) 953 8888.

CommuniTech and Computer '87 Malaysia: The second Malaysian International Electronic Communications, Office Technology and Business Computer Show, will be held at Kuala Lumpur from November 10 to 14. For more information contact Australian Exhibition Services on (03) 267 4500.

The EDP Auditors Foundation Conference: The 18th Conference is to be held in Atlanta, Georgia, US on the 10th to 15th of April, 1988. Write to The Program Chairman, The EDP Auditors Foundation, Box 88180, Carol Stream, IL 60188-0180 or telephone 312/653-0950. □



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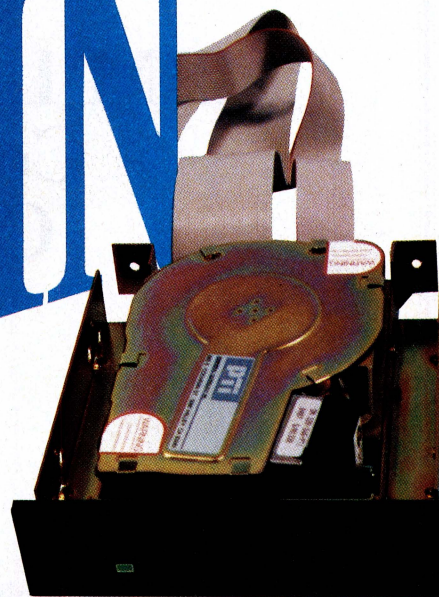
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Power Consumption;	6.5 watts typical

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IBM UNDERGROUND

Spreadsheets form one of the less well represented areas in public domain and user supported software. Until now those available have effectively been subsets of the industry leaders. Now there is one which takes a new direction — QubeCalc is a *truethree* dimensional spreadsheet (as opposed to some two dimensional spreadsheets which merely link cells of multiple spreadsheets together).

The WorkQube

The QubeCalc spreadsheet (known as the WorkQube) may be most easily thought of as a large cube containing 262,144 cells. These cells are arranged into 64 rows, 64 columns and 64 pages. The 3 dimensions of the WorkQube are named X, Y and Z. There are 6 different faces on the WorkQube (just like on a toy block), which are named A, B, C, D, E and F.

QubeCalc provides a familiar spreadsheet window into each of these 6 faces, which allows you to view, enter, or otherwise manipulate your data from any of the 6 faces of the WorkQube. This provides 6 different 'perspectives' of the data stored within the WorkQube and any one slice of the WorkQube can be displayed on the screen. The real power of QubeCalc is its ability to rotate the WorkQube to allow you to look at your data from many different perspectives.

Data is entered into the QubeCalc WorkQube, just as with any other spreadsheet and the WorkQube treated as if it were 64 spreadsheets linked together.

QubeCalc can turn rows into columns, columns into pages and so on, to allow you to look at your data in any perspective you desire. It has 44 predefined mathematical, statistical, financial, date, time and logical functions. A datafill command is included which is not limited to even increments and macros are supported. The registered version also has context sensitive help screens and imports Lotus files.

The Display

The QubeCalc screen looks much like the screen of any other spreadsheet. It consists of cells laid out in rows and columns. A highlighted axis across the top of the screen displays the letters of the columns which are currently visible on the screen and a highlighted axis down the left side of the screen displays the numbers of the rows which are currently visible on the screen.

The QubeCalc screen provides information such as the number of bytes available for data, the current directory for data files, the name of the current file (if any), the current block for recalculation and a cell status line. The cell status line is located in the top lefthand corner of the screen and looks something like this:

```
[C]B4;5: NUMBER (9)
```

This gives a lot of information about the current perspective and cell. The [C] indicates that you are currently viewing perspective C, the B4;5 tells you that the cell you are currently at is in column B, row 4 and page 5. The current orientation of the axes may be changed using the /WorkQube Perspective command. This will in effect rotate your data so that you may view it from another perspective.

The next item, NUMBER, tells you what type of item is in the current cell (this item can be either BLANK, TEXT, NUMBER, FORMULA, or ERROR). And finally, the value in the parentheses, (9), tells you what the width of the current cell.

Entering Data Into The WorkQube

Each of the cells in the WorkQube may hold a either a number, some text, or a formula. Up to 70 characters may be entered into each cell.

Numbers may range from $-1.0E+37$ to $+1.0E+37$ and can have up to 11 significant places. A number may be entered in either standard notation (say, 12.345) or in scientific notation (say, 1234.5e-2).

Text strings may be entered into a QubeCalc cell by simply typing in the string. If the text contains more characters than the column is wide and if the adjacent cells are blank, it will spill over into adjacent cells. If the adjacent cells contain data, then the extra characters in the text string will be hidden from view.

A QubeCalc cell may contain a formula made up of numbers, references to values in other cells, predefined functions and mathematical and logical operators. A formula must begin with an = sign and may be quite complex. QubeCalc provides a large assortment of predefined functions which may be used in formulas. The functions must be entered in capitals, which is a minor annoyance.

The mathematical functions for QubeCalc are:

```
@ABS(X),
@EXP(X),
@LN(X),
@LOG(X),
@INT(X),
@FRAC(X),
@MOD(X,Y),
@RAND,
@ROUND(X,Y),
@SQRT(X),
@FACT(X),
@SGN(X)
and @CELL.
```

The trigonometrical functions are:

```
@PI,
@COS(x),
@SIN(x),
@TAN(x),
@ACOS(x),
@ASIN(x)
and @ATAN(x).
```

You can also use statistical functions which are:

```
@AVG(list),
@COUNT(list),
@MAXI(list),
@MINI(list),
@STD(list),
@SUM(list)
and @VAR(list).
```

There are also a number of financial functions available; @FV(Payment, Interest, Periods) represents the future value of an annuity; @PV(Payment, Interest, Periods) represents the present value of an annuity; @PMT(Principal, Interest, Periods) represents loan payments per period while @CGR(Present Value, Future Value, Periods) represents the compound growth rate for an annuity.

QubeCalc represents dates as serial numbers where Jan 1, 1900 = 1, Jan 2, 1900 = 2 and so on. Time is represented as a fraction where midnight = 0.0, noon = 0.5, 6.00pm = 0.75 and so on. This allows dates and times to be manipulated with ordinary arithmetic operations. The functions for date and time are:

```
@NOW,
@DATE(y,m,d),
@TIME(h,m,s),
@YEAR(X),
@MONTH(X),
@DAY(X),
@HOUR(X),
@MINUTE(X),
and @SECOND(X).
```

The logical functions are:
 @TRUE,
 @FALSE,
 @IF(CONDITION,
 ARG1,
 ARG2)
 and @CHOOSE (SELECTOR, ARG1,
 ARG2, ..., ARGN).

Absolute and Relative Cell References

Cell references in a formula can be either absolute or relative. Absolute cell references begin with the character \$ (for example; \$A1;1) but relative cell references do not use any special character. It did not seem possible to have mixed addresses with, for example, the row absolute and the column and page relative.

The Command Menus

QubeCalc provides many powerful commands which are available through the Command Menus, called up by pressing the / key, as is done with Lotus.

The /Cell command provides options dealing with the contents of a single cell. These are Format, Width, Erase, Justify and Copy. The /Block selection provides options dealing with the contents of a block of cells which you define. The defined block may consist of a single cell, a 2 dimensional range of cells, or a 3 dimensional block of cells. The commands are Format, Width, Erase, Justify, Copy and DataFill. The /WorkQube selection provides options dealing with the contents of all the cells in the QubeCalc workspace. These are Format, Width, Erase, Justify, Perspective, AutoCalc, Order and Color.

The /Insert command provides the capability to insert a blank row, column, or page of cells into the WorkQube. The /Delete command provides the capability to delete a row, column, or page of cells from the WorkQube. The /Print command provides the capability and options to print defined blocks of cells on a printer or to a file. The /Graph command provides the capability and options to create graphs

from data within QubeCalc. The /File command provides the capability to save and load all or part of the cells to/from a file. The /Quit command exits QubeCalc. The WorkQube is not automatically saved but the user is prompted to save. If the file name selected already exists, the user has the option of making a backup or overwriting the existing file.

Function Keys

QubeCalc makes good use of the function keys, and most have functions familiar to users of Lotus:

[F1] **HELP** — Calls up a context sensitive HELP screen.

[F2] **EDIT** — Allows editing of cell contents.

[F3] **BLOCK** — Allows definition of blocks when entering formulas.

[F4] **ABS** — Toggles references between absolute and relative.

[F5] **GOTO** — Jumps to a designated cell.

[F6] **FIND** — Searches for a given string in the WorkQube.

[F7] **STAT** — Displays status and defaults of the WorkQube.

[F8] **MACRO** — Allows definition of macros.

[F9] **CALC** — Recalculates the WorkQube.

[F10] **GRAPH** — Displays the graph defined by the current settings.

Availability

QubeCalc is distributed as a complete and running system through the normal user supported and public domain channels, though the files needed for context sensitive help and 1-2-3 import are not included and are only provided with when registration is made with the author. The version tested did not have them and I cannot therefore make any further comment.

Qubecalc is a product of The FormalWare Co, PO Box 21726, San Jose, Ca. 95151-1726. Registration is \$US54.85 plus postage and includes a printed manual (not reviewed) and advice of updates. My copy came from the PC Users Group Inc, PO Box 52, Belconnen 2616 ACT. Price from them is \$7 plus \$3 post and pack.

Qubecalc is an amazing product and will become one of the top user supported spreadsheets. With a speed around 25 percent of that of Lotus it is highly competitive with many Lotus clones at an even lower price. The 3 dimensional structure takes a little experimentation to exploit but is clearly and immediately an effective way to consolidate data and derive reports from a number of criteria. Well worth trying, and registering. □

Perspective A)

	Jan 83	Apr 83	Jul 83	Oct 83	1983
Rent (83)	\$300.00	\$310.00	\$320.00	\$330.00	\$1260.00
Util (83)	\$50.00	\$51.00	\$52.00	\$53.00	\$206.00
Auto (83)	\$150.00	\$152.50	\$155.00	\$157.50	\$615.00
Food (83)	\$250.00	\$252.00	\$254.00	\$256.00	\$1012.00
Tot (83)	\$750.00	\$765.50	\$781.00	\$796.50	\$3093.00

Perspective B)

	Apr 83	Apr 84	Apr 85	Apr 86	Apr Tot
Rent (Apr)	\$310.00	\$350.00	\$390.00	\$430.00	\$1480.00
Util (Apr)	\$51.00	\$55.00	\$59.00	\$63.00	\$228.00
Auto (Apr)	\$152.50	\$162.50	\$172.50	\$182.50	\$670.00
Food (Apr)	\$252.00	\$260.00	\$268.00	\$276.00	\$1056.00
Tot (Apr)	\$765.50	\$827.50	\$889.50	\$951.50	\$3434.00

Perspective C)

	Rent (83)	Rent (84)	Rent (85)	Rent (86)	Rent
Rent (Jan)	\$300.00	\$340.00	\$380.00	\$420.00	\$1440.00
Rent (Apr)	\$310.00	\$350.00	\$390.00	\$430.00	\$1480.00
Rent (Jul)	\$320.00	\$360.00	\$400.00	\$440.00	\$1520.00
Rent (Oct)	\$330.00	\$370.00	\$410.00	\$450.00	\$1560.00
Rent (Tot)	\$1260.00	\$1420.00	\$1580.00	\$1740.00	\$6000.00

Table 1. QubeCalc provides a familiar spreadsheet window which allows you to manipulate data from any of the 6 faces of the WorkQube. Shown above are three 'perspectives' of a sample WorkQube. Perspective A) shows the amount of money spent on various items over 4 months during 1983, as well as the total spent on each item. Perspective B) shows the amount spent on these same items during April over 4 years and the total spent on each in that month. Perspective C) shows the amount spent on one item in different months over a period of years and the total.

YOUR IBM

I have just come across one more way to transfer files from 135 mm (5 1/4 inch) to 90 mm (3 1/2 inch) disks using Laplink, a software plus cable solution, as is Brooklyn Bridge, which I wrote about in September. In both cases, software is transferred from a 135 mm disk on one machine to a 90 mm disk on the other via the RS 232 port on each machine and a cable.

While both run at 115200 bits per second, Laplink has a different approach in the way the software is written and run. As you may recall, Brooklyn Bridge uses a device driver on one machine, which becomes the host, and runs an executable program on the other machine, which becomes the remote. The host then has access to all drives on both machines from DOS and from within any program.

Laplink runs an executable program on both machines and allows file transfer from one machine to another.

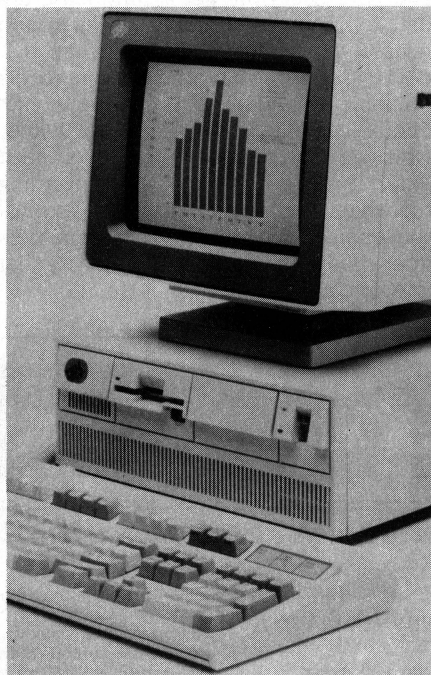
Laplink runs an executable program on both machines and allows file transfer from one machine to another. A fast run through the operation of LapLink may clear things up for you. The LapLink package contains two disks, one 135 mm, one 90 mm. It also contains a cable with 4 connectors. At each end is a 25 pin and a 9 pin connector. The wiring between the ends is crossed to form a null modem cable. It can be used to connect almost any combination of IBM compatible machines.

Plug your two PCs together. The LapLink program is in a file called LL.EXE on each of the disks. Run it and each machine will display a screen with a directory listing of the local default directory on the left side and the remote default directory on the right. Now you can change directories or drives on either machine and can copy one file at a time, or groups of files using 'wildcards', from one machine to the other.

The up and down cursor keys select a file in the default directory while the left and right cursor keys swap between the local and remote directory.

A number of commands are available:

Log changes the default drive or directory on either machine; *Copy* copies the file under the cursor to the default drive on the other machine; *Options* sets options for copy and wildcopy (Subdirectories can copy all files in the default directory and all directories beneath it. Modified only copies those files which are different. Date copies files with creation dates in a specified range.); *Wildcopy* copies a group of files using DOS-like wildcards; *Setup* configures the session (The settings may be



saved permanently. A number of parameters can be selected, but, in particular, the transmission speed can be reset as low as 9600 baud should your serial port/cable combination have some problem.); *View* allows contents of the file under the cursor to be read; *Delete* erases the files under the cursor; *Rename* allows renaming of files; *Quit* returns to DOS (of course!).

I tested Laplink by connecting an IBM PC and a Toshiba laptop; seeing files copied from one to the other at lightning speed is amazing. I also found an unexpected use while testing an AT clone with one of those 1.2 megabyte floppies that writes narrow tracks on 360 kilobyte disks that cannot reliably be read by the normal 360 Kbyte drives in PCs. Here I transferred data files back from the AT to the PC quickly and without error. It also proved to

be a far faster way to transfer files to the AT for testing than copying onto a floppy and then back onto the AT hard disk.

Laplink does not support the use of drives on the remote machine under DOS the way Brooklyn Bridge does, but it does have one very great advantage. Because Brooklyn Bridge is more ambitious in its aims and uses device drivers to access remote drives, it does not work with some hard disks that use device drivers or host operating systems. These include older Tallgrass external drives and Davong external drives. Laplink accesses all the drives from the executable copy of the program running on the same machine. It works well with my Davong and with Tallgrass drives. Laplink can be driven from either machine, unlike Brooklyn Bridge which can only be driven from the host.

Both Brooklyn Bridge and LapLink are worth a look. If your hard disk is very IBM compatible then Brooklyn Bridge is more versatile. If you have one of those ersatz hard disks like mine, LapLink is a must. The ability to copy whole disks of files while retaining their sub-directory structure is a real bonus.

Laplink is from Travelling Software. My copy came from Discware of 3 Smail St, Broadway, NSW 2007; (02) 212-6933. Price is \$249.

Find That Software!

What's the hardest thing in the world to find? A ready to run, fully debugged subroutine, or an essential programmers tool, that's what!

One of the benefits of C is its ability to use libraries of user written functions. To make life even easier there are now a plethora of commercial libraries and a million tools for C programmers. The names of many of these will be familiar from advertisements in the US magazines, but rarely is any detailed information available. Deciding if one is worth having can be somewhat of a lottery.

To ease this problem, Fagan Microcomputer Systems (FMS) has created a Technical Software Reference manual. FMS is an importer/distributor/retailer and authors' representative specialising in tools for serious programmers, with an emphasis on C programmers. Its new manual gives comprehensive details of a vast compendium of these tools. It consists of a three ring binder nearly 50mm thick. This is divided into sections based on the

company which created the software. Details on each product include the functions in a library and what they do, the CPU, operating system and RAM required and disk requirements. Typically, product details are from two to four A4 pages.

The nice part is that, while the details of each product have been written with the active participation of the software authors, they are far more than a mere advertisement. As an example, the part of the Reference about Lattice products totals 30 pages and the details of other vendors are also quite voluminous.

Vendors currently in the manual are Lattice (C compilers, tools, encryption and communications), Media Cybernetics (Halo), Phoenix (C tools), Softcraft (Btrieve), Graftalk (charting), Unipress (Emacs), Vermont Creative Software (Windows For C), Age of Reason (Run C), Blaise Computing (C routines including communications), CES (Magic series), Compuview (Vedit), DMA (Ascom IV), Essential (communications functions in C), Greenleaf (communications and general functions in C), JMI (Bastoc) and GSS (Graphics).

Pages of information on Microsoft, MicroWay, Aldebaran, Polytron and Faircom products are being prepared and separators are already in the binder waiting for them to be inserted.

The effort in assembling all this information, formatting it in a consistent fashion and publishing it in a high quality binder is fantastic and the results worthwhile. To filter out the school project brigade, a nominal charge of \$20, plus \$6 for postage and packing has been imposed — a small fraction of the cost of production and about the cost of the binder full of an equal amount of blank paper. In addition the fee includes perpetual registration and purchasers will get a continuing update as products are added, deleted and revised without paying another cent.


The Technical Software Reference is available from FMS, 95 Canterbury Rd, Middle Park, Victoria 3206; (03)-699-9899. Now you can find that function you need and not waste hours or days reinventing the wheel. Well worth getting for any advanced user, very useful for programmers in any language and absolutely essential for C programmers.

User Groups

I am delighted that the secretary of yet another PC User Group has contacted me with information on the Group and its library.

The PC Users Group Inc. of the ACT sent me a copy of its catalogue of Public Domain software. The Group has taken a slightly different approach to its library and has created its own collection of disks with a numbering system unique to the ACT. It has 444 disks of general software, with usually one major package or two per disk, and 36 disks of utility software each with many small utility programs. The catalogue is a very pleasant surprise, too. It is a paperback book, A5 in page size, and with 114 pages, apparently typeset with a laser printer. Very legible and easy to read. The Group charges a copying fee of \$7 per disk, including the price of the blank disk, and postage is \$3 for up to 4 disks, \$5 for 5 to 8 disks.

The Group librarian can be contacted at PO Box 52, Belconnen, ACT 2617. Meeting details should be available from the same address. □



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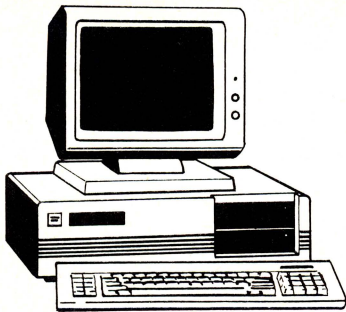
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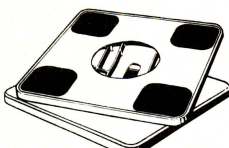
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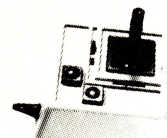
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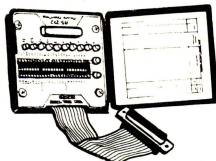
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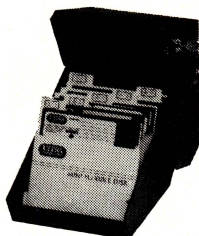
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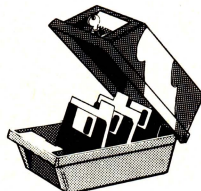
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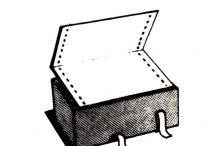
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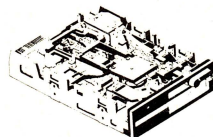
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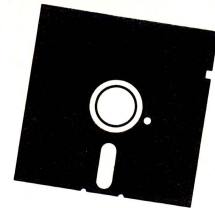
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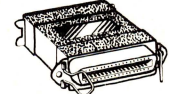
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2. South Australian residents need not purchase a subscription to enter, but may enter once only by submitting their name and address on a hand drawn facsimile of the

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3. Prizes are not transferable or exchangeable and may not be converted to cash.
 4. The judges decision is final, no correspondence will be entered into.
 5. Description of the competition and instructions on how to enter and conditions of entry form part of the competition conditions.
 6. The competition commences on September 1 and closes on last mail December 31st. The draw will take place in Sydney on January 18th, 1988, and the winner will be notified by telephone and letter. The winner will also be announced in the Australian

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YOUR C64

Earlier this year I reviewed a speed-up kit for the 1541 called Dolphin Dos (see Y.C. Apr. '87 issue). It's a hardware/firmware modification which produces blistering speed improvements by communicating to the drive along a parallel bus, rather than the standard serial one. I was so impressed with it that I bought one myself and after six months of constant use I've had little cause for regret. However, a couple of days ago I had a call from an unhappy owner. He claimed that although D-Dos worked fine on all of his commercial software, it didn't seem to produce I/O speed improvements when used with a program he'd written himself.

After a little questioning, it turned out that his problem was not with Dolphin Dos, but with his program. It simply could not process the data it read off the disk fast enough to take advantage of D-Dos's speed. What he had encountered was one of the inherent limits of Commodore's Basic V.2.

Speed Limits

In the power department, the C-64 is limited by its processor clock speed. In Australia, it runs at 985,250 cycles per second, or just under 1 MHz. The 128 can be made to go twice as fast, but only if the screen and I/O ports are turned off (which is okay for number crunching). In each clock cycle the computer can do one very basic action, in most cases not even enough to complete a single machine language instruction. Still, there are a lot of clock cycles in a second, so quite an impressive amount of work can be done in that time.

The C-64's Basic however, is an interpreted one. This means that the overhead (the number of cycles spent working out what each Basic instruction means) is abnormally high. Basic may have been designed to be versatile and easy to program and debug, but it wasn't built for speed. When it comes to disk I/O, even a small amount of Basic processing can slow the computer down to the point where it is the limiting factor — slower even than the 1541, let alone Dolphin Dos!

The easiest way around this bottleneck is to compile your programs. A compiler is a way of producing code that is 'pre-interpreted'. Compiled programs will run several times faster than un-compiled ones, but they have the disadvantage of being harder to debug or modify, and also most compilers usually add around 8K to the size of the program.

Using Machine Language

On the other hand you could leave most of the program in standard V.2 Basic and simply employ a few machine language routines to do the time dependent work. That's what the rest of this column is about — a relocatable assembly language routine that will handle read/write disk I/O. It's a useful bit of code, so, just in case you want to modify it or use it in your own programs, I've included a little more detail than usual, plus a full PAL assembler source code listing.

Relocatable programs are ones that don't contain location specific addresses. This means that you can put them wherever you like in memory, although you should take care to place them where Basic is not going to affect them. You can do this by raising the bottom of Basic by adjusting the pointers at locations 43 and 44, or you can lower the top of Basic by adjusting the pointers at 55 and 56.

If you do the latter, just make sure your program doesn't perform a CLR or Opens or Closes the RS-232 channel as those actions re-set the top of Basic pointers. Your machine language program may not be hit immediately, but sooner or later Basic will want to use those locations for storing its own variables and that's when your code will be corrupted. Listing 1 is a Basic loader for the machine language. As it's written, the code will be placed, starting in location 49152 — this is at the beginning of a 4K area that is safe from Basic, but you can put the code somewhere else simply by changing the value assigned to 'i' in line 10.

How It Works

The program makes use of four zero page locations, from 251 through to 254. You need to POKE 251 and 252 with the lo-byte/hi-byte address of the start of the memory area you're reading or writing to. An example of how to do this is in lines 10 and 20 of Listing 2. In that example, ADDR is the address of the memory you want to load to — the code converts it into the correct POKE values. I won't go into ex-

plaining lo-byte/hi-byte terminology here because I haven't the space, but suffice to know that it's got to do with the way the 6510 reads addresses in machine code. If you follow the example you'll be okay even if you don't understand it. Machine language programmers should note that locations 253 and 254 are also affected by this routine, even though you don't directly POKE to them.

```
10 i=49152
20 read a:if a=256 then end
30 poke i,a:i=i+1:goto 20
49152 data 24,144,60,133,253,134,254,32
49160 data 204,255,162,5,32,201,255,32
49168 data 183,255,48,19,160,0,177,251
49176 data 32,210,255,165,251,197,253,208
49184 data 10,165,252,197,254,208,4,32
49192 data 204,255,96,32,49,192,24,144
49200 data 227,24,165,251,105,1,133,251
49208 data 165,252,105,0,133,252,96,133
49216 data 253,134,254,32,204,255,162,5
49224 data 32,198,255,32,228,255,160,0
49232 data 145,251,32,183,255,208,12,165
49240 data 252,197,254,208,14,165,251,197
49248 data 253,208,8,32,204,255,165,251
49256 data 166,252,96,32,49,192,24,144
49264 data 218,256
```

Listing 1. A Basic loader for the machine language.

Next, the routine will want to know the upper limit of the memory into which the file is to be read. If the code didn't have this feature you could easily mess up your program by having data overwrite locations much higher than you intend. To pass your upper limit value to machine language, I've exploited locations 780 and 781. These are used to load the 'a' and 'x' registers whenever you SYS to machine language. I used them on this occasion because I'm trying to make the program as location independent as possible and since the operating system reserves them anyway, I'm not tying up any RAM that was otherwise free.

Again the numbers POKEd should be in lo-byte/hi-byte format. In this example, (Listing 2, line 25), I've set the upper limit to 53247, which is the end of the RAM area we are working in. If you try to read a file

```
10 addr=50000:x=int(addr/256):a=addr-256*x:print a,x
20 poke 251,a:poke 252,x:rem initialise base address
25 poke 780,255:poke 781,207:rem set max limit to 53247
30 open 5,8,5,"myfile.s,r":sys 49152:close 5
40 print"top of load was":i=peek(780):j=peek(781):print(i+256*j)
```

Listing 2. Demonstration of the routines discussed in the text.

larger than the space you've defined, the routine will stop at the top point and return to Basic with the excess unread. As it stands the code doesn't tell you if this has happened, but it shouldn't be hard to modify it to do so. Having set start and end addresses for the read, all that needs to be done is to OPEN the file and SYS to the routine. The SYS address for a Read is the first byte of the machine code, wherever you placed it.

Note that you have to CLOSE the file from Basic after you return. Whenever you return from a SYS routine, locations 780 and 781 hold the contents of the 'a' and 'x' registers as they were just before the RTS. I've used this feature as a way of passing back to Basic the top address of the load.

Line 40 simply prints out that address, but in a proper application you would want to keep track of it for when you want to eventually refile the data. Saving a file in memory is a fairly similar procedure. Again you have to set the zero page pointers to point to the beginning of the memory you want to file (line 60). I skipped re-setting the 'a' and 'x' registers in this example, because they still hold the top address from the Read we just performed. If we had SYSed to some other routine in the meantime they would have to be properly set.

Writing Data

To save the data to disk you OPEN the file and then SYS to a location that is 3 bytes further in than where the machine language code begins — this is shown in Listing 3.

```
50 rem now lets save it
60 poke251,a:poke252,x
70 open 5,8,5,"test.s,u":sys49152+3:close5
```

Listing 3. To save the data to disk you OPEN the file and then SYS to a location that is 3 bytes further in than where the machine language code begins.

They should be identical. These routines are much faster than Basic and are more than adequate for keeping up with Dolphin Dos. You can also use them to Load and SAVE PRoGram files such as sprite data or bit-mapped graphics: you just need to change the 's' in the OPEN statement to a 'p' — but remember that in PRG files the first two bytes are the lo-byte/hi-byte address of the location where the program is meant to belong. You can allow for this by reading or writing those bytes from Basic before you SYS to the routine. □

LISTING 4 PAL SOURCE CODE

```
c000      *= $c000
          ;disk read/write routine by Ian Allen
          ;for the public domain
          ;
c000      clrchn = $ffc      ;kernal calls
c000      chrout = $ffd2
c000      chkout = $ffc9
c000      chkin  = $ffc6
c000      getin  = $ffe4
c000      readst = $ffb7
          ;-----
c000      botmem = $fb      ;zero page addresses
c000      topmem = $fd
          ;-----
c000 18      clc
c001 90 3c      bcc read      ;branch to read section
          ;write to disk
c003 85 fd      sta topmem
c005 86 fe      stx topmem+1   ;a,x hold top of write address
c007 20 cc ff      jsr clrchn
c00a a2 05      ldx #05
c00c 20 c9 ff      jsr chkoutc00f 20 b7 ff      jsr readst ;check i/o status
c012 30 13      bmi abort     ;exit if bad
c014 a0 00      write ldy #0
c016 b1 fb      lda (botmem),y
c018 20 d2 ff      jsr chrout
c01b a5 fb      lda botmem
c01d c5 fd      cmp topmem
c01f d0 0a      bne oinc      ;test 1 for end
c021 a5 fc      lda botmem+1
c023 c5 fe      cmp topmem+1
c025 d0 04      bne oinc      ;test 2 for end
c027 20 cc ff abort jsr clrchn
c02a 60      rts             ;exit point
c02b 20 31 c0 oinc jsr addit
c02e 18      clc
c02f 90 e3      bcc write
          ;-----
          ; this subroutine simply increments pointer by 1
c031 18      addit clc
c032 a5 fb      lda botmem
c034 69 01      adc #01
c036 85 fb      sta botmem
c038 a5 fc      lda botmem+1
c03a 69 00      adc #0
c03c 85 fc      sta botmem+1
c03e 60      rts
          ;-----
c03f 85 fd      read sta topmem
c041 86 fe      stx topmem+1
c043 20 cc ff      jsr clrchn
c046 a2 05      ldx #5
c048 20 c6 ff      jsr chkin
c04b 20 e4 ff read1 jsr getin
c04e a0 00      ldy #0
c050 91 fb      sta (botmem),y
c052 20 b7 ff      jsr readst
c055 d0 0c      bne read2     ;exit if error
c057 a5 fc      lda botmem+1
c059 c5 fe      cmp topmem+1
c05b d0 0e      bne rdinc
c05d a5 fb      lda botmem
c05f c5 fd      cmp topmem
c061 d0 08      bne rdinc
c063 20 cc ff read2 jsr clrchn
c066 a5 fb      lda botmem
c068 a6 fc      ldx botmem+1
c06a 60      rts
c06b 20 31 c0 rdinc jsr addit
c06e 18      clc
c06f 90 da      bcc read1
          ;-----
```

Listing 4. A full PAL source code listing for the Disk Read/Write Routine discussed in the text.

MICROBEE FILE

Welcome to a new *Your Computer* regular column — the Microbee File. Each month we will be bringing you news, reviews, and applications for your Microbee. We will fill the gap for those who subscribed to the now demised Microbee Journal, *Online*. For those who have never read or heard of *Online*, you're in for a real treat: we're in the business of making your Microbee work for you, so if there is an application you're interested in or a piece of software you want us to put through the hoops, just drop us a line care of *Your Computer*.

As many of you will know, Microbee was a small step ahead of the rest by packaging WP, spreadsheet and programming languages with its computers so that new owners had something to sink their teeth into right away. This can only be commended, but lately it seems that Microbee Systems is tending to 'unbundle' the units and even charge extra dollars for the manuals — not very user friendly at all!

But, as you'll agree, the basics only get you so far. Soon you need to branch out and start using software that is more tailored to your needs. This will be one of the focuses of this section: to test drive and recommend CP/M business, school and family packages which will make your Microbee, dare we say it, buzz.

Microbee News

□ Queensland readers, please note that the Brisbane office of Microbee Systems has closed. All repairs and orders must now be directed through the Gosford/Sydney offices.

□ It's now possible to order software and hardware from Microbee Systems using Keylink electronic mail — you don't have to be a subscriber and all it costs you is the price of a local call. If you wish to use this method, make sure you have an up-to-date price list in front of you and dial 01921 if you're operating at 300 baud, or 01923 if you're operating at 1200. Once the Auspac opening menu is displayed, type *?keyl*. You will then be asked for your user name which is *beeline* and your password which is *microbee*. The on-screen prompts will guide you from there.

□ Microbee has now ceased to allow trade-ins of any components against new hardware. This surprise move will disappoint many of those hoping to upgrade cheaply to a 256TC.

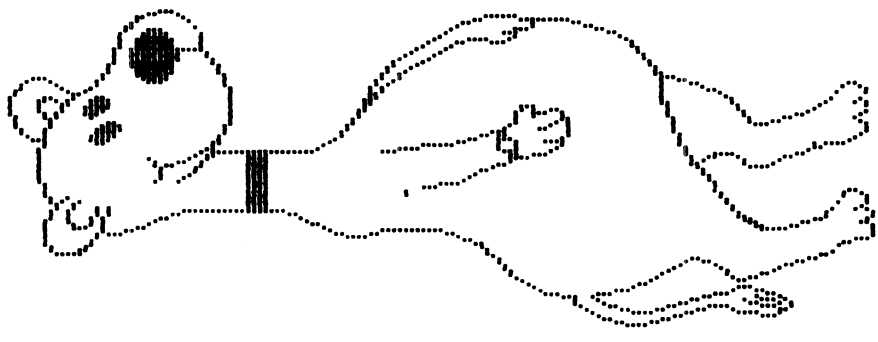
□ Microbee has just announced a new ver-

Results for : Dof Dickinson

The parent Zeephon you chose

h e R B w s T P F X
h E r B w s t p F X

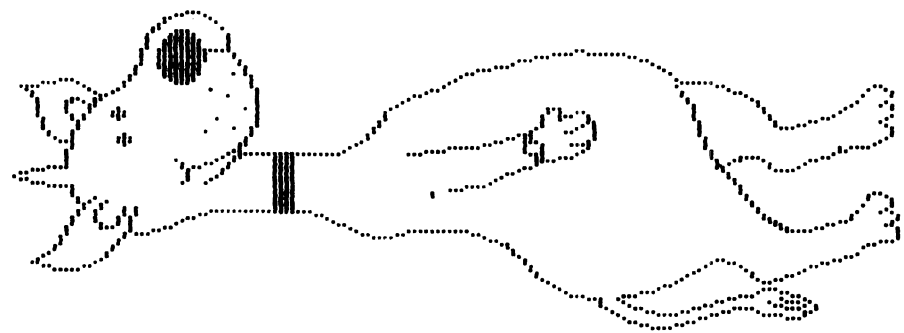
Female



The third generation--Filial Three (F3)

h e r b w s T P f Y
H e r B w S T p f X

Male



Two members of a Zeephon family — handsome, eh?

sion of Simply Write which now enables you to incorporate pictures with text. We've only tried an alpha test version at this stage and it did have a few bugs which need to be ironed out. We should have a review of the on-sale product ready for next month.

□ Schools purchasing a new disk system this term are entitled to three free full colour teaching posters and a disk of software. Included on the disk are a selection of extra fonts and pictures to use with Electric paintbrush, some Simply Write picture files and a number of datafiles to use with Simply DB.

Zeephon

— Get into Genes!

If there's been a new baby in your life lately, you'll know all about genetics. Aunties and mothers-in-law are resident experts:

they glare at each other across the cradle declaring, 'He has his mother's eyes, but Uncle Jim's nose.' Arguments break out over the origin of the bundle-of-joy's ears: 'Jug ears don't come from our side of the family.'

Now if only you could recall your high school genetics, you'd be able to flatten their arguments with a few quick mentions of phenotypes and genotypes or homozygous and heterozygous genes. As it is, you only have yourself to blame for not getting hold of a copy of Zeephon and running it though your Microbee well in advance of The Happy Event.

Zeephon is not just the name of the program, it's the name of a fictitious animal which looks something like a loveable dragon and comes in genetic variations so numerous as to stymie even Auntie Fay as to their origins. And if you're teaching

genetics in school this year, or simply curious to find out what your own offspring could possibly look like, this is the program for you.

There are three learning levels in Zeephon. Level One presents fundamental genetic terminology and a simulation of cell division. The first screen page, which describes a cell's make-up, is built up line by line. As each component is introduced, so it is shown pictorially in a cell which appears on the right of the screen. Students are then introduced to a Zeephon and shown its genetic make-up and the number of chromosomes it has. A table of comparison is presented which shows the haploid and diploid number of chromosomes. (In case you've been wondering, a goldfish has 47 pairs of chromosomes, while we humans have only 23).

The phases of cell division are then animated to clarify how genes are passed on, with special reference to the sex gene and its unique division. Finally, there's a lovely step-by-step screen animation of cell division.

There's no denying that this is a school tutorial program — 16 pages to read at this level alone — but it's interactive, which makes it ten times more enjoyable than a book, even if it's not so much fun as the real thing!

Still, you do get your chance to be parents in a way: Level Two of the program asks you to create your very own Zeephon and then predict how its offspring will look when mated with random partners for the next three generations. As each set of genetic possibilities is presented on screen, you are asked to key in your predictions. Your real baby Zeephon is then revealed and, at the touch of a spacebar, you are shown how it varied, or didn't, from your predictions.

Lots of wriggling sperm swim frantically for the fertile eggs animated on screen at the appropriate moments in the program (it's all done with impeccable taste). In fact it happens (logically enough) every time a new generation of Zeephons is conceived, along with a simulation of the random selection of genes. This provides plenty of revision at each stage of Level Two.

On completion of Level Two, you can print out your three generations of Zeephon progeny, along with a tally of your score and a record of the genetic make-up of each one. The end of this level is indicated by — you might have guessed — a little white dot swimming across the bottom of the page to place a full-stop at the end of the sentence.

Level Three is a shorter tutorial which looks at advanced genetic terminology and the probability of genetic inheritance. Students are asked to decide on the possible genotypes for wings for two Zeephons. In case you've forgotten, genotypes are gene pairs and phenotypes are the appearances (hereditary characteristics) of animals as a result of their genes. Students select a male or female genotype and then look at the outcome of random combinations. This leads to a table of probability which enables them to predict the ratio of offspring phenotypes, given the parents' genotypes.

And that, in case you have been wondering, is how you account for your babies sky blue eyes, when you and your husband have hazel eyes — it was all your blue-eyed grandparents' fault.

Design Your Computer's Christmas Card and Win a Copy of Printmaster!

Have you ever thought you might like to try your hand at graphic designing? Well, here's your chance to put your creative talent to work and come up with an exciting greetings card that we can use as the Your Computer Christmas Card.

The card can be put together using any program on your computer, as a collage using scrap parts of your computer, using pictures cut from brochures or magazines, simply using paper and pen or any other medium you decide. It can be any shape or size — within reason! All we ask is that you create a Christmas Card with a computing theme.

The best three entries will each win a copy of PrintMaster plus Art Galleries I and II from Dataflow — value \$100 plus! PrintMaster will run on Amiga, Amstrad, Atari, Apple, Commodore, Microbee, IBM and NJX computers. If a winner does not have one of these machines, we'll offer software to the value of \$100 instead.

PrintMaster — the Prize!

PrintMaster is a program that you'll never shelve. It contains a lifetime's printing — with it you can create cards, full-size banners, notices, monthly or weekly calendars, advertisements or your own letterheads (the designs on this page were created using PrintMaster).

The program is simple and fun to use. You select from a number of menus which item you wish to print — card, notice or whatever. Next you select from different borders to place around the edge, choose from a number of different typefaces to

write in, and pick different graphics to use as illustrations. If you're not happy with your work, editing is easy and you can play around with your personal designs until you're sure they're perfect.

When you want to experiment with new graphics in your PrintMaster documents, you can invest in Art Galleries I and II which contain hundreds of images to liven up your personal printing press; depending on your type of computer, the price varies from \$45.30 to \$62.32.

PrintMaster is available from most shops, but if you have queries, contact Dataflow on (02) 331 6153.

How to Enter

First, if you're 18 or younger, design a Christmas Card with a computing theme (only one entry per person; age will be taken into consideration). Then, simply send your creation to: *Christmas Competition, Your Computer*, PO Box 227, Waterloo 2017. You must include your name and address plus your age and make of computer to be eligible. Note: the competition closes with the last mail on **December 15, 1987** — so be quick!

Winners will be notified by telegram within 1 week of the closing date. Employees of The Federal Publishing Co and Dataflow (and their families) are not eligible to enter. Entries will be judged by the editor of *Your Computer* and two nominees appointed by him; the judges' decision will be final and no correspondence will be entered into regarding the competition.

Merry Christmas card creating! ☐



YOUR APPLE

A thousand dollar MS-DOS card for the Apple II appears at first sight to be a bit expensive when there are IBM clones around for not much more than that price. But don't be too sure.

I guess like most other people, I persist in thinking that a plug-in IBM emulator card is always going to be second- or third-rate. If I had unlimited money (and less sense) and wanted an MS-DOS machine permanently, my first choice would be an IBM AT or a Compaq Portable II — these are the first-ranking MS-DOS machines in my opinion with enough speed not to drive me up the wall. IBM programs are usually agonisingly slow.

Second choice, if I was strapped for ready cash, would be one of the better clones and only if I was at the bottom of the money barrel would I consider a plug-in card for my Apple IIs or the Macintosh. At least, these *were* my prejudices.

Austek Microsystems Ltd (AML) in the States (which is 60 percent owned by the Adelaide company, Austek) is releasing its II-Blu card for the II+, IIe and IIGS this month. The card will probably be handled in Australia by Imagineering and the rumoured price at the time of writing is just a touch over a thousand dollars — but for this you get the card plus an IBM-format 5¼ inch disk drive — everything you need except for MS- or PC-DOS on disk.

The card uses an Intel 8086 processor running at 7.2 MHz, together with an NEC VLSI chip (which is probably made for them by Austek Australia) and which seems to make the machine very fast. There's also a socket for an Intel 8087 maths co-processor.

The prototype I had to play with had 640 kilobytes of RAM on board, but the company intends to market a basic card with only 256 Kbyte of RAM and sockets for the rest. One bonus for users of this card is that when you are using your Apple as an Apple, this 256-640 Kbyte of 'Blu'-RAM is automatically available for normal memory expansion.

So, for your thousand dollars (or so) you are getting a disk drive, very fast MS-DOS capability and an Apple extended memory card. The economies of the situations immediately start to look a lot better, don't they?

I only had the card on loan for a very short time and it was a 'beta' test version with 'alpha' software — so I expected to find a whole range of glitches, bugs, video

instabilities and so on. But it was superb. A few of the menu selections weren't implemented, however, so I can't claim that this is a product review — merely a taste of what's to come.

The card conforms with IBM's CGA graphics standard, which is always a problem with IBM clones. And this gives me further reason to invest in an Apple IIGS. Until recently I've just borrowed a GS when I needed it; colour does very little for me in my normal use of a computer and I'm trying to discourage my work machines from being used by the local ankle-biters for games. But to see MS-DOS versions of Paradox, Wordstar 2000 and PFS:Write in glorious, sharp, stable colour on the GS screen is a real delight.

The other value of the GS over my old IIe for MS-DOS is the keyboard layout. I don't have a numerical pad on my IIe and you really need this for the IBM system — it is used for the Page-Up, Page-Down, Home and so on commands.

Apparently, all Apple peripherals will work with the II-Blu card.

The IBM system also usually requires 10 function keys on the left-hand side of the keyboard — and you don't have these with either the GS or the IIe. However you do get the functional equivalents by using the Apple Option key together with one of the number keys across the top of the keyboard.

If you want, AML make an IBM-type keyboard which plugs directly into the GS and I wouldn't be surprised if third-party developers don't quickly come up with a small function-key pad which plugs into the regular GS keyboard. Either way, the GS will be more than adequate, while the IIe will be make-shift.

One of the reasons why the II-Blu card will succeed where others have failed, is because this card is fast — between 2 and 3 times the normal speed of an IBM XT in my experience. According to a beta-manual that came with the card, a series of tests of processing speed using the standard Norton Utilities gave the card a rated index of 3.5 — and that places it

about halfway between the XT and AT.

So, what you are getting if you buy this card is an IBM machine that is considerably faster than the standard IBM PC and most of the clones. The only fair price comparison is therefore with one of the 80286-based clones around — and these are from about \$3,000 up. Even then you will lack some of the features that you get from having both machines built into one.

Actually, of course, if you've got an Apple GS with a Softcard, you can have five and a half machines built into one. Look at it this way — you've got the old 8-bit Apple II, the new 16-bit Apple II/GS, CP/M on the Softcard, a standard IBM PC/XT, full emulation of the new IBM PS/2 Model 30 and in addition you can read and write Macintosh text files. Full Macintosh emulation is the only part of the main-stream computer spectrum missing — so you've almost got every system that matters on the one machine.

The AML floppy drive system that comes with the II-Blu card is a 360K 5¼ inch model (which is the old IBM standard before they went up to 760 Kbyte drives) but you can daisy chain out of this with up to four more drives. These drives don't have to be the special IBM-format types — the system conversion is all done by the card's on-board controller and in the primary disk drive, so you can add your standard platinum Apple 3½ inch drive (not the UniDisk) and get IBM compatibility even on the small disk size. With this set-up the card can therefore run software intended for the IBM portables and for the new PS/2 Model 30s.

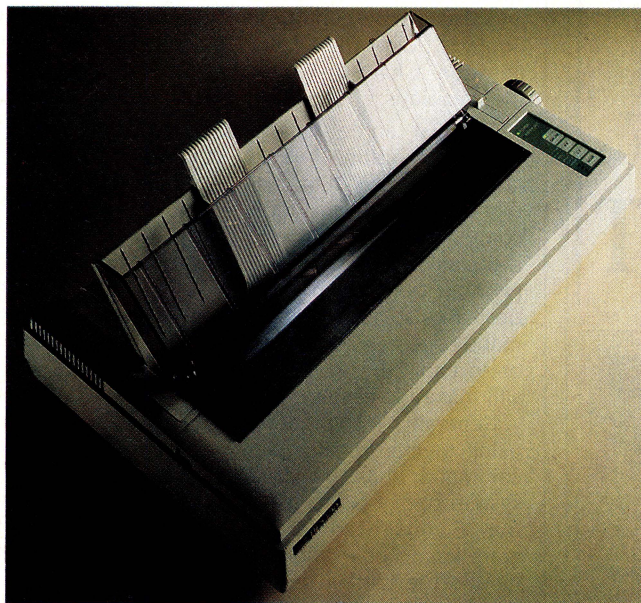
You can both read from, and write to, these drives in the IBM format. Apparently the only thing you can't do is to format a disk on the 3½ inch Apple drive and have it read by an IBM machine. The IBM formatting process isn't built into the small drives; however, if the disk was originally formatted on an IBM, then the Apple drive can write on it and have the material read by an IBM later.

In practice, all this means is that you'll borrow an IBM PC for an hour and format a whole box of disks — and then you'll be OK. This was the only limitation to the system that I found in the (admittedly) very short time I had with it.

Peripherals

Apparently, all Apple peripherals will work with the II-Blu card: the Apple mouse be-

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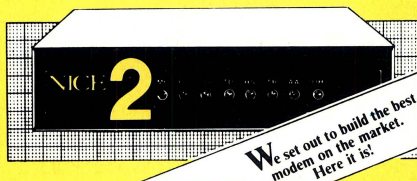
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comes an IBM mouse; the printer works as an IBM printer. It has hard disk support for both Apple hard drives and it handles the Thunderclock, Hayes compatible modems, serial and parallel Grappler cards, the speaker, joystick and so on. Amazingly, the Apple analog colour monitor on the GS also substitutes for the IBM digital colour monitor; there must be a lot of intelligence built in to the card to handle these conversions.

There are transfer utilities which let you send files between ProDOS and MS-DOS, and they'll handle hard disk to floppy, or floppy to floppy transference. You can also partition a hard disk and transfer across the partitions.

DIF files can be transferred without the translation utility, but you always need the utility for ASCII or text files. An important feature in translation is that the incoming file won't write-over another file of the same name on the destination disk (without permission). The MS-DOS utilities can also support some ProDOS commands such as commands to delete files or to show the ProDOS directory. These will make life easier.

Generally, you've got a choice between using menus for all operations or using command lines, which again make the system both easy to use and flexible. On the GS you'll need Version 1.1 of the Program Launcher — the older version won't handle the card. I should also mention that it has an auto-configure utility and it uses a desktop type operation while in MS-DOS.

It is pretty apparent when you look at the II-Blu card that Apple have had a lot of input in the design — especially in making the system user-friendly. The menus and help information on the screen read like Apple's normal intelligent guff-free text, not like the jargon-laden rubbish you get on most other computers.

I suspect, however, that Apple don't quite know what to do with this little gem of a card that has fallen into their laps. The II-Blu card looks as if it might be very successful and, to a degree, its success will reflect on Apple's own Macintosh. II-Blu looks better than AST's MS-DOS card for the Mac SE (you've got the colour for a start) and the last thing that Apple want at present is the old Apple II series giving them more competition for their Mac push.

Mind you, the II-Blu card still might not make it on sale here or in the States. There must have been a dozen or so attempts to produce MS-DOS cards for the Apple II and all have failed, to date. There's nothing

inherently difficult about it; the problem is one of cost.

To make a saleable plug-in MS-DOS card it was thought that you had to keep the price below that of comparable clones and nowadays these base-level machines are ridiculously cheap in the States. AML might have found the answer by opting for processing speed and special features, rather than just low cost.

Orange Micro was showing its prototype MS-DOS emulator (called DOS Boot) for the GS up until only a few weeks ago, but apparently price has killed them too — they won't be going to market.

And AST, which makes the Macintosh MS-DOS cards for both the SE and the II, say that they might eventually build an MS-DOS board for the II-series as a 'strategic move' but they don't expect to make any money from it. I wouldn't bet on it now that II-Blu has come out.

Pathways

There is also a rumour around that AST are working on a universal disk-drive controller which will read and write ProDOS, DOS 3.3, MS-DOS and Macintosh files. This is all due to be announced at the annual AppleFest which is taking place about the time you will read this.

Apple are obviously working hard to implement full portability between their product lines and those of IBM. The Apple Programmers and Developers Association (280 SE 43rd Street, Renton, WA 98055 USA) has released MacPassport which allows the Macintosh to read Apple II ProDOS files from a UniDisk. In the near future the program should also allow you to read Apple ProDOS files on an IBM.

The early version of Passport has been around for a while, but with this translation disk and a bit of programming, developers can tailor an application to read and write files in application format. This means that you can transfer files, say, between the Microsoft Works program on the Macintosh and AppleWorks on your Apple II.

There are a couple of other attempts at providing a pathway between the Apple II and other machines. Asky Corp (770 Sycamore Drive, Milpitas, CA 95035 USA) make the Envoy disk-drive controller which apparently lets an Apple II read and write MS-DOS files — but the II-Blu will now do this also.

CMS (3080 Airway Avenue, Costa Mesa, CA 92626 USA) have done something similar in software for the Macintosh. It apparently lets the Mac share disks with an IBM and an Apple II, and read files from both of them. □

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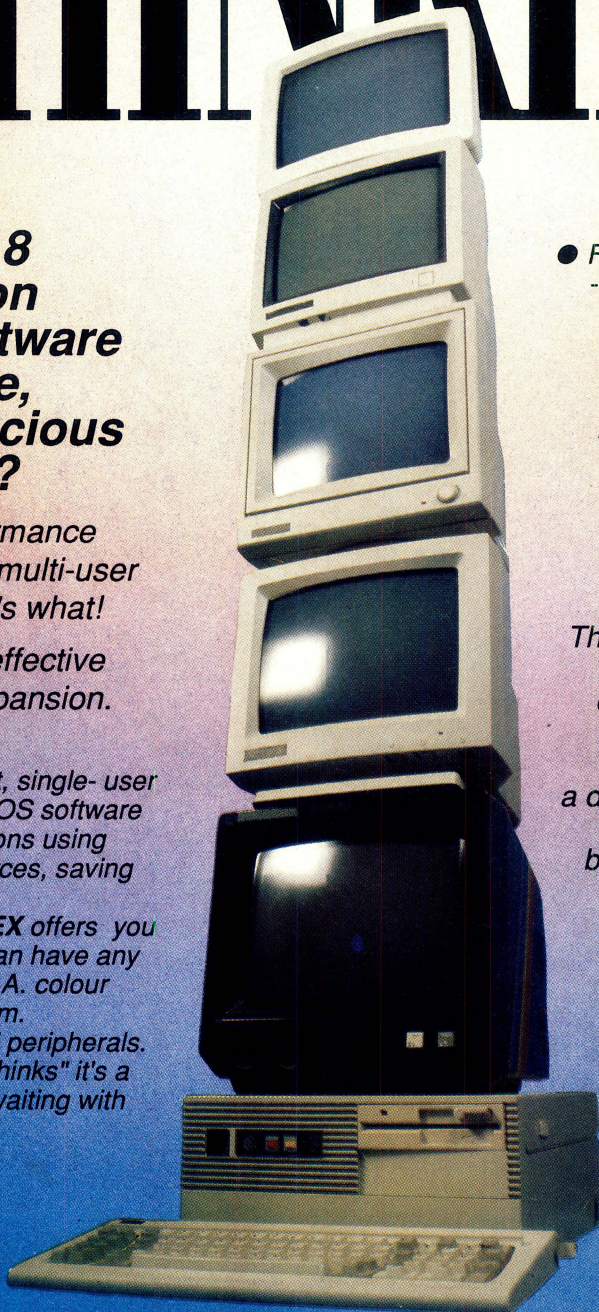
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YOUR AMSTRAD

You'll no doubt be delighted to know that the National Bible Society of Scotland is now doing a revision of the spelling of the Bible in Gaelic (the first of its kind to be undertaken since the translation was originally completed in 1801) using an Amstrad PCW 8256, running WordStar. You'll also be delighted, I'm sure, to discover that the Amstrad PC now has 23 percent of the PC market in Britain (some other company called IBM has 31 percent at the moment). I knew you'd want to know that.

This month, we'll be investigating a graphics program which produces an amazing result on the 464 and 6128, showing how to get 'foreign' Basic programs to run on the Amstrad PC and more.

The Dionysian Spiral

The program shown in Listing 1 is written for the 464 and 6128. Known as the Dionysian Spiral, it creates a very impressive effect when running. It's a great demonstration program to show off the graphics potential of your computer.

Once you've had your fill of Dionysian Spirals, press any key and the program will end.

The Case of the Squashed W

Danny Deane from North Balwyn in Melbourne runs WordStar on his PCW (although he is not currently translating the Footy Record into Gaelic on it) and says that, from time to time, he's noticed that when scrolling through a long document using Shift, rather than the down cursor key, great chunks of text appear to vanish.

However, the text is still there, although WordStar appears to have problems doing complete screen updates if you're moving very quickly through a document. To get the vanished words to reappear, all you need to do is place block markers anywhere in the last section of the text. Then, remove the highlighting when the full document reappears.

You may have noticed that the W on the PCW looks unnecessarily squashed up when printed out in 12 pitch. To get round this, you can get the computer to print out just the W in 10 pitch, and then swap back to 12 pitch for the rest of the document. It sounds a strange thing to do but it works quite well. All you have to do, when you've finished working with a document, and before you print it out, is to use Find and Ex-

change to swap all Ws with + Pitch 10 w -Pitch.

Alien Basics on the PC

Although Amstrad PC owners have been blessed with a much better than normal Basic with Basic2, the fact that it is non-standard can cause a few problems. The most common one is trying to access Basic programs written on an ordinary clone.

John Baugham of Kensington in NSW is one of a number of people who've said they've got hold of public domain disks of

Basic programs and have found that their Amstrad PCs refuse to read the files, even when the program is called up under Basic2. You can get round this relatively easily so long as you have another Basic (Basic, Basica or GWBasic) or you have a mate who has them and can be persuaded to do a little fiddling for you. Basic2 will only read Basic files which have been saved in ASCII format.

To convert a 'foreign' Basic program so it will run under GEM and Basic2, you need to load the program in either language on your Amstrad PC, running Basic, Basica or GWBasic which was loaded in from the A> prompt and then resave it in ASCII format. You do this by saving it as: SAVE 'name'.A.

Then, you can call up the file using your mouse under Basic2 and it will run normally. You may need to add some window commands and so on to ensure that it works. In addition, if your program contains the statements RANDOMIZE or DEFINT, just cut out these lines. SOUND and COLOUR statements may also cause a few hassles, depending on how they have been used. The simplest way to convert a program is to use the procedure above to get it in ASCII form, run it on the Amstrad PC, and if any line hiccups, just add the word REM to the line after the line number. You should find, in 99 percent of cases, your program runs perfectly well, even with the troublesome lines converted into REM statements. I do not suggest you delete the problem lines as they may well be called by GOSUB or GOTO statements elsewhere in the program.

The simplest way to set up your windows, so that the full screen can be used, is to include the following line as the first line of your program:

```
CLS:CLOSE #2:CLOSE WINDOW
3:CLOSE WINDOW 4:WINDOW #1 FULL ON
```

Hope this does the trick for you! ☐

Share It

I'D BE MORE than happy to share any of your discoveries, hints, tips, comments and programs with other users. Please send them to Your Amstrad, Tim Hartnell, Your Computer, PO Box 227, Waterloo, 2015 NSW. ☐

```
10 REM DIONYSIAN SPIRAL
20 REM YOUR COMPUTER
30 RANDOMIZE TIME
40 INK 0,6:BORDER 6,2:MODE 0:CLG
   0:PAPER 0:SPEED INK 3,7
50 VARS=200:VIM=60
60 DIM Z(14)
70 FOR K=0 TO 14
80 INK K+1,K
90 NEXT K
100 INK 7,6,2:INK 2,24,0:INK 12,16,5
110 ORIGIN (VARS+2*VIM),VARS
120 FOR ALAN=103 TO 0 STEP -1
130 SUGAR=ALAN*PI/52
140 MOVE COS(SUGAR)*-VIM,
   SIN(SUGAR)*-VARS
150 DRAW COS(SUGAR)*318,
   SIN(SUGAR)*VIM,ALAN MOD 13+1
160 NEXT ALAN
170 BORDER 6
180 REM -----
190 WHILE NOT FINISHED
200 JUMP=0.3*RDND
210 FOR T=1 TO 16+JUMP STEP JUMP
220 FOR K=0 TO 14
230 INK K+1,K+T
240 IF INKEY$<>"" THEN 350
250 NEXT K
260 NEXT T
270 FOR T=16 TO 2-JUMP STEP -JUMP
280 FOR K=0 TO 14
290 INK K+1,K+T
300 IF INKEY$<>"" THEN 350
310 NEXT K
320 NEXT T
330 IF RND>0.55 THEN H=INT(RND*15):INK
   0,H:BORDER H
340 WEND
350 MODE 1
```

Listing 1. This program for the Dionysian Spiral, written for the 464 and 6128, is a great demonstration to show off the graphics potential of your computer. Note: Lines 40, 140, 150 and 330 (shown on two lines) are actually one line. There are no spaces following the comma in lines 140 and 150.

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Contributions by Telephone: Contributors who have modems and suitable software (in the MODEM7/YAM mould — see our stories on Christensen Protocols in the May and June 1983 issues) can arrange direct transfer to our com-

puters through our Bulletin Board system, which is on-line 24 hours a day, seven days a week. Contact our office by phone for details on transferring material in this way.

Contributions on Disk: Contributions can be accepted in most disk formats, although some have to be converted outside our offices, which will add to the (often lengthy) delay between receipt and acknowledgement. The preferred medium is IBM standard format single-sided, single-density, 20 cm CP/M disks or IBM PC-DOS minifloppies. We can also handle, in-office, most soft-sectored 13 cm disks, thanks to PC-Alien — so unless you have a particularly strange format, send it on disk straight from your machine. Please pack them extremely carefully if posting and label all disks with your name, address and phone number.

Listings: Unless it is absolutely impossible, we want listings produced on the computer. This reduces the risk of error — if the computer typed it, the computer probably accepted it. Print listings with a dark — preferably new — ribbon on white paper, and try to format the output to a narrow (40 characters) width. If they can't be produced on a printer, borrow a good typewriter — hand-written material is likely to sit around the office for a year before someone can find time to type it all out for you! Please provide an account of what the program does, how it works and so on. Any comments on the program should refer to the address, line number or label rather than to a page number. Any comments on modifying the program to work on other machines will be appreciated. Try to include a printout of at least part of a sample run if possible.

Style: All items should be typed (or printed) and double-spaced on plain white paper. We will only accept original copies — no photostats. Include your name, address, telephone number and the date on the first page of your manuscript (all manuscript pages should have your surname and page number in the top right-hand corner). Be clear and concise, and keep jargon and adjectives to a minimum. □

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CURSORY GLANCE

How do you make a parking meter user-friendly? Consider the trouble most people have with computer programs which are supposedly user-friendly and allegedly do all manner of wonderful things. A parking meter has a very low level of attractiveness even when it is only a coin-operated simpleton. Make it computerised, credit card-operated and high-tech and you have created a monster. Comments have ranged from 'a boffo success' to 'I think it's great, but you need a three-week course to understand the thing'. Guess which one came from a motorist.

■ One supplier of computers and software for solicitors has in its literature that its product will 'increase your file velocity'. When I receive something like that I'm inclined to increase the advertising velocity towards the garbage. Ironically, it took two months and several phone calls to get the most basic information from this firm. And at the moment I am worth several potential sales of several thousands of dollars. I wonder what the response would be if I just idly enquired about their products. File velocity indeed!

■ We respond according to the way we are treated. A friend did a seminar recently. As each person arrived, the facilitator placed a label on their forehead. The labels said such things as: stupid, genius, crybaby and mother. No-one knew what was on their forehead, but in a few hours each was behaving as described on the label. If people treat you as a genius, you may respond in a matching way even though you can't read the label they use for you. I suspect that computer programs have a similar effect. Unfortunately, most of them treat us as if we are idiots.

■ Some enterprising person could set up as agent for shareware and do the authors and the buyers a great favour. Shareware is software which is available freely through the public domain — on disk, on electronic bulletin boards and so on.

It is free, but you are encouraged to send a fee to the author, usually a resident of the US if you like the software. It's too much effort for most people to get the US dollars together and send them off, and I suspect that few Australians participate.

Sending your moolah usually means that you get a better copy of the manual and the software and get notice of updates and bug fixes. If someone offered a

quick turnaround on shareware without the hassle of needing to change currencies it could be a worthwhile sideline.

Anyone who does so can contact me with a list of what they are handling and its overseas authors and I'll run it here.

■ So much for the crackdown on software piracy in Singapore. I received a price list recently for software starting at US\$9 and going all the way up to US\$82 for programs listing at US\$54 to US\$1000 in their home countries.

The list included AutoCAD, Clickart, Lotus, MS Word, GEM and Symphony. Don't bother ringing me for the details, I won't pass them on.

Bootstrap

Most visitors to Switzerland get to see how big a part of the tourist industry the army is. Most guides show tourists the defenses the army has against invasion by tanks, foreign labourers and the like. There are millions of people in the reserve army and they are ready for anything except a nuclear war. This is definitely the army's greatest earner of foreign revenue. But, following on from the success of their other great product, the Swiss Army Knife,

they have decided to go into the silicon business.

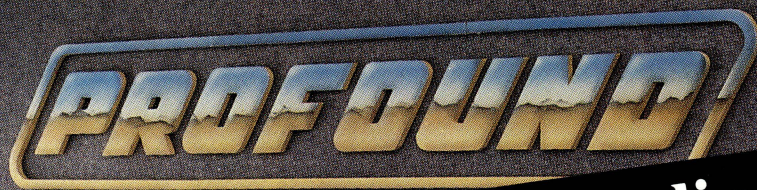
They have produced a computer which is an ideal partner to the knife. It is made of stainless steel and red plastic, it carries the Swiss cross and it is high tech. They are not the only similarities. It is also extremely versatile, very compact and highly reliable.

The computer comes equipped with integrated software which does an enormous range of tasks. These include word processing, spreadsheeting, typing tutor, online banking (of course), database management, project management, charts, drawing, desktop publishing, outline processing and real-time home management (running the home heating, lighting and video recorder). And of course, it has a small foldout metal prong — after all, no Swiss Army computer would be complete without a gadget to remove things from horses' hooves.

□ Michael Burlace is an independent computer consultant operating from the Sydney Information Technology Centre (Ittec). He may be contacted by writing to PO Box 57, Broadway 2007 or by phoning (02) 281 2111. □



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